An Assessment of Monetary Integration in the West African Monetary Zone (WAMZ): Feasibility and Trade Implication

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Abstract

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Keywords: WAMZ, optimum-currency-areas, shock asymmetry, gravity model of trade, intra-ECOWAS trade, real exchange rate, ECOWAS single currency.

This thesis provides an assessment of monetary integration in the West African Monetary Zone (WAMZ) focusing upon its feasibility and trade implications, in order to inform policy about the group's deep integration scheme. The first aspect of the original contribution of the thesis focuses on one of the main issues in the debate of the monetary union in the WAMZ, namely the degree of asymmetry in macroeconomic shocks. The study examines the real effective exchange rate (REER) behaviour among the prospective candidates to assess the degree of potential costs of giving up monetary policy autonomy. The evidence reported from VECM, impulse response and variance decomposition analysis points to heterogeneous economies. Therefore, idiosyncratic shocks imply the need for different policy responses to adjust to macroeconomic shocks. The findings strengthen the case for policy autonomy in the region. The second aspect of original contribution of the thesis evaluates the potential effect of a common currency on trade among WAMZ member countries. Using the existing currency union in ECOWAS, the CFA franc zone, the chapter estimates the effect of a common currency on bilateral trade over the period 1980-2016 using the gravity model. The main conclusion reached is that membership of the CFA franc zone has promoted bilateral trade among members by 60%. The findings support the hypothesis that a common currency increases bilateral trade, which is a helpful guide for a WAMZ monetary union. In summary, the thesis demonstrates that in the long term, a common currency would promote intra-community trade, but at present, a monetary union is not feasible due to asymmetric macroeconomic shocks. Therefore WAMZ deep integration scheme would require members instituting adequate alternative adjustment mechanisms such as fiscal transfer schemes.

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Contents

List of tables

List of figures

List of abbreviations

BCEAO	Banque Centrale des Etats de l'Afrique de l'Ouest (the Central Bank of WAEMU)
BEAC	Banque des etats de l'Afrique Centrale (the Central Bank of CAEMC)
BEER	Behavioural Equilibrium Exchange Rate
CFA	le Franc de la Communauté Financière Africaine
DOTS	Direction of Trade Statistics
ECOWAS	Economic Community of West African States
EEC	European Economic Community
ERP	Economic Recovery Programme
EMCP	ECOWAS Monetary Cooperation Programme
EMU	European Monetary Union
ETLS	ECOWAS Trade Liberalization Scheme
GDP	Gross Domestic Product
IFS	International Financial Statistics
OCA	Optimal currency area
OLS	Ordinary Least Squares
PPML	Poisson pseudo-maximum likelihood
RER	Real Exchange Rate
REER	Real Effective Exchange Rate
RTA	Regional Trading Agreements
SIC	Schwarz Information Criterion
SVAR	Structural Vector Autoregression
UNCTAD	United Nations Conference on Trade and Development
VAR	Vector Autoregression
VECM	Vector Error Correction Model
VIF	Variance Inflation Factor
WACB	West African Currency Board

WACH	West African Clearing House
WAEMU	West African Economic and Monetary Union
WAMA	West African Monetary Agency
WAMI	West African Monetary Institute
WAMZ	West African Monetary Zone
WAUA	West African Unit of Account
WDI	World Development Indicators

Chapter 1 Background and research motivation

1.1 Introduction

This thesis provides an empirical examination of the possible effects of monetary integration in the West African Monetary Zone (WAMZ). Specifically, the study uses optimal currency area (OCA) theory to assess the disadvantages (costs) and benefits (trade creation) of the probable monetary integration in the region, a topic that is relatively unexplored in the literature. This chapter provides the background for the study. It also states the main findings of the research.

The remainder of the chapter is organised as follows. Section 1.2 provides the background of the study and an overview of the main literature. Section 1.3 provides the importance of the study, research aim and research questions. Section 1.4 presents a brief overview of the main findings of the study. Finally, section 1.5 outline the structure of the rest of the thesis.

1.2 Background

Regional economic and monetary integration is a long-standing facet of policy and development strategy in West Africa (Masson and Pattillo 2005; Masson 2008). The recent decade has seen considerable debate and policy discussions in the region about the gains from economic integration. More importantly, these developments focus on the means to which economic and political integration could spur macroeconomic integration, accelerate poverty reduction and achieve higher economic growth and development in the region (Cobham and Robson 1997; Debrun et al. 2005; Fielding and Shields 2005; Tsangarides and Qureshi 2008; Oshikoya 2010; Robson 2010; Ekpo and Udoh 2014).

The Economic Community of West African States (ECOWAS) was formed in May 1975 as a regional economic bloc, with a current membership of fifteen states. Namely, Benin, Burkina Faso, Cape Verde, Cote d'Ivoire (Ivory Coast), The Gambia, Ghana, Guinea Conakry, Guinea Bissau, Liberia, Mali, Niger,

Nigeria, Senegal, Sierra Leone and Togo. The ECOWAS intends to promote economic integration in all fields of economic activity. In particular, the bloc aims to promote co-operation and integration, leading to the formation of an economic union in the region, stipulated in Articles 2 and 3 of the 1975 and 1993 treaties, respectively (Ogunkola 1998; Aryeetey 2001).

An economic union would likely maintain and enhance economic stability as most of the economies are characterised by exchange rate instability, financial fragility, high inflation rates, and low intra-regional trade (Fielding and Shields 2005). Further, it is a possible solution in generating opportunities to exploit economies of scale in production and trade, foster relations among member states, contribute to the progress and development of the region and guarantee the group's influence in international negotiations (Oshikoya 2010). Besides, the gains from economic integration bound up with increased cross-border trade (Rose 2000) is essential here as the small economic size and market of most of these countries represent severe constraints on their autonomous development (Fielding and Shields 2005; Robson 2010).

In 1990, ECOWAS adopted the Trade Liberalisation Scheme (TLS) becoming a Free Trade Area (FTA) (Kenen and Meade 2010). Sequentially, ECOWAS became a customs union in 2015 with a common external tariff (CET).[1] However, despite such efforts, ECOWAS is yet to see significant improvement in intra-regional trade, a key objective for its establishment (Debrun et al. 2005; Masson and Pattillo 2005; Cissokho et al. 2012). On average - overlooking informal trade - intra-ECOWAS trade as a percentage of total trade between 1996 and 2016 has barely increased beyond 10%.[2]

Among other non-tariff barriers such as poor transport infrastructure, weak trade institutions, less export diversification (i.e. dependence on export of primary commodities) one key challenge to intra-ECOWAS trade is the absence of regional currency convertibility and exchange rate stability (Lavergne 1997; Sachs and Warner 1997; Subramanian et al. 2004; Hulej et al. 2006; Yang and Gupta 2007; Alagidede et al. 2012; Cissokho et al. 2012; Turkson 2012).

[1] For more details see http://www.ecowas.int/

[2] The data source is the UNCTAD Database 2018. The value of the total trade is constructed by taking the sum of the values of total exports and total imports of the group.

Robson (2010) reiterates that the basic requirement for effective market integration or customs union is the presence of currency convertibility within the group. In the ECOWAS, currency convertibility does not exist for most of the countries, except for and within the West African Economic and Monetary Union (WAEMU), an existing monetary union involving the eight former French colonies having a single currency (CFA franc) and a common central bank.[3] Sy (2014) reports that about 50 per cent of intra-African trade financial settlements are conducted with banks outside the continent at extra cost due to exchange rate conversion. The incurring of high transaction costs serves as a disincentive for trade and investment, creating some rigidity in the sub-region (Masson and Pattillo 2005; Hulej et al. 2006). Therefore, one possible route to reduce currency conversion costs and promote trade integration in the West Africa sub-region lies in achieving regional currency convertibility (Fielding and Shields 2005).

Today, ECOWAS is aiming to introduce a single currency for its fifteen-member states in 2020. The two-track strategy adopted requires harmonisation of economic policies to pave the way for a merger of the WAEMU and non-WAEMU countries. Correspondingly, in 2000, the Heads of State of five West African countries (The Gambia, Ghana, Guinea, Nigeria, and Sierra Leone) - all former British colonies except Guinea - established a second monetary zone, known as the West African Monetary Zone (WAMZ) in Accra, Ghana. Liberia acceded to the WAMZ Agreement in 2010 and became the sixth member of the WAMZ. As part of the fast-track approach to monetary integration in West Africa, the WAMZ established a convergence process toward launching a single currency, the ECO, in 2003.[4]

However, the authorities postponed the launch to 2005, 2009, and 2015 because the convergence criteria were not met by some countries (Kenen and Meade 2010; Bakoup and Ndoye 2016). The lack of convergence resulted in the decision to abandon the two-track approach. ECOWAS, therefore, adopted a single convergence criterion for all the fifteen-member state intending to

[3] In the thesis, we will sometimes refer to WAEMU countries as the West Africa CFA franc zone or CFA countries and the WAMZ ones as English-speaking countries.

[4] The introduction of WAMZ single currency, known as 'eco' and a shared central bank is conditional on the convergence of a set of specific quantitative and qualitative macroeconomic indicators (see Chapter 3 for the convergence criteria).

introduce the single currency in 2020. Notwithstanding, the achievements of the convergence criteria by WAMZ members are decisive for the prospective ECOWAS monetary union since most of the other countries are already in a currency union (Oshikoya 2010).

Monetary integration has several components, including countries sharing a common currency and a central bank. Albeit, the two key characteristics of monetary integration are; when a group of countries permanently peg their exchange rates to each other in the integrated area and allow full convertibility of national currencies within the region (Tavlas 1993; Robson 2010). It is worth mentioning that monetary cooperation and integration is a broader area of study which encompasses economic and political cooperation. Also, monetary integration covers the integration of financial and banking systems and coordination of policy for the implementation of a common currency. Therefore, it is important to clarify that this study is an economic analysis, where the scope is limited to the empirical examination of the feasibility of the proposed monetary integration among WAMZ economies by considering some OCA criteria. Hence, the discussion should not be regarded as the sole basis for evaluating the pros and cons of monetary integration in WAMZ since it omits the potential changes that could be induced through a policy process of monetary integration.

The main literature on monetary integration consists of two strands. First that participating in monetary union invariably entails the loss of independent national monetary policy, and the associated nominal exchange rate flexibility, as policy instruments for adjusting to asymmetric shocks (Mundel 1961; McKinnon 1963; Kenen 1969). Therefore, in order to minimise the potential costs, Mundel (1961) suggests the importance of factor mobility, wage flexibility and the absence of asymmetric macroeconomic shocks in an optimal currency area. Thus, the theoretical development of the OCA became the workhorse framework for the assessment of the costs and probable benefits of a currency union.

Prior empirical research emphasises the ‘optimality’ of WAMZ in order for a common currency to suffice in the region (Debrun et al. 2005; Alagidede et al.

2008; Tsangarides and Qureshi 2008; Coulibaly and Gnimassoun 2013; Asongu 2014; Harvey and Cushing 2015). These studies have attempted to evaluate the optimality of WAMZ by using various OCA criteria, but have produced inconclusive results. It is argued that one of the most important criteria for assessing the optimality of countries for a monetary union is the degree of macroeconomic shock asymmetry (Mundell 1961; McKinnon 1963; Kenen 1969). If shocks are symmetric across countries, then a shared policy response (i.e., monetary or fiscal expansion/contraction) would be adequate. However, if macroeconomic shocks are highly idiosyncratic, a standard monetary policy will be inappropriate (Bayoumi and Eichengreen 1992; Buiter 1997; Buiter 2000; Pisani-Ferry 2013).

One way of understanding the degree of shock symmetry of WAMZ is to investigate shocks to the real effective exchange rate (REER), since the REER is likely to move in response to unexpected rather than to expected changes in macroeconomic variables (Alexius and Post 2008; Kizys and Pierdzioch 2009; Dumrongrittikul and Anderson 2016). Specifically, this thesis addresses the issue of shock asymmetry using the dynamics of the REER (see, chapter 4). Such an investigation provides an opportunity to examine the cost of WAMZ countries surrendering their national monetary policy autonomy and exchange rate flexibility to a transnational institution.

In the second strand, critics argue that the traditional OCA literature establishing critical conditions for successful monetary integration is inadequate, as it mainly focuses on evaluating the costs of the monetary union (Tower and Willett 1970; Ishiyama 1975). In the light of these developments, the new OCA literature suggests that monetary union could entail benefits for its members: (a) is accompanied with adoption of a more efficient and credible monetary practice (Barro and Gordon 1983; Giavazzi and Giovannini 1989; Beetsma and Giuliodori 2010),[5] (b) the elimination of exchange rate risks and transaction costs associated with common currency could increase trade and business

[5] A country that suffers from an inflation bias and lacks credibility (Barro and Gordon 1983), can reach a low inflation reputation overnight by surrendering itself to the control of the low inflationary central (supranational central bank) (Giavazzi and Giovannini 1989). Beetsma and Giuliodori (2010) suggest that the incentive for the central bank to relax monetary policy is particularly strong when the central bank is under the influence of a government that wants to reduce unemployment. However, this is beyond the scope of this thesis.

cycle synchronisation between its members (Frankel and Rose 1998; Rose 2000; Frankel and Rose 2002; Baldwin et al. 2008; Tavlas 2009).[6]

The seminal paper of Rose (2000) found that countries in a monetary union trade three times more than non-members. This finding initiated an extensive debate on the impact of currency union on trade, and since then, several empirical studies have been undertaken with varying results (Alesina and Barro 2002; Frankel and Rose 2002; Glick and Rose 2002; Micco et al. 2003). However, few papers have considered the trade impact of a common currency within ECOWAS, though the CFA franc zone has existed for over half a century. These sparse studies (Anyanwu 2003; Carrère 2004; Nitsch 2004; Ajayi 2005; Fielding and Shields 2005; Masson and Pattillo 2005; Hulej et al. 2006; Masson 2008; Zannou 2010; Adam and Chaudhry 2014) have reported varying results. Besides, there has been some criticism of earlier empirical studies utilising the often-preferred lognormal gravity equation with OLS for providing implausibly large currency union effects due to treatment effects. These include the potential endogeneity of monetary union membership, omitted (unobserved) variables, zero-valued trade flows, among others (Persson 2001; Melitz 2004; Baldwin 2006b; Burger et al. 2009).

Based on these criticisms, we cannot assume that the effect of a currency union is identical across all currency unions, over the country of coverage and period. We, therefore, focus on the experience of the West African CFA franc zone and argue that their experience would be more representative of the trade benefit of the future currency union in West Africa. We further address the argument of unobservable or omitted variables bias and zero trade flows in the analysis using recent developments in the econometric analysis of the gravity equation.

1.3 Significance and aim of the research

This study is motivated by the lack of adequate research on assessing the costs and benefits of monetary integration in WAMZ. Specifically, the two main factors that motivate the research undertaken in this PhD study are. First, in section

[6] De Grauwe (2018) further indicates that a currency union instigates greater financial integration, which in turn reduces the cost of trading and therefore facilitates stronger trade.

1.2, we stated that the failure of WAMZ countries to meet the convergence criteria has led to several postponements of the launch of the single currency.

Consequently, there is ambivalence as to whether WAMZ or ECOWAS countries are ready for a common currency. The decision by these countries to surrender their national monetary policies to a supranational central institution is a vital economic policy that deserves empirical inspection. There is a dearth of research on the costs of monetary union in the region. Therefore, the findings of this study may be important to policymakers in determining whether the countries are in an excellent position to form a currency union. This will inform whether the cost of surrendering national monetary policies would be high or less.

Second, there is a need to highlight the consequences of the common currency to WAMZ members. The works of Rose (2000) and other studies have widely established the impact of a common currency on trade. However, there is a lack of adequate research focusing on ECOWAS countries. Moreover, there has been criticism of previous estimates for establishing implausible large and statistically positive impact of currency union on trade. Therefore, we cannot assume that introduction of ECOWAS single currency will increase trade among members as the effect of a currency union is identical across all currency unions. In this context, this thesis focuses on the experience of the existing currency union - the CFA franc zone – in ECOWAS to inform academic discussion, policymakers and other stakeholders on the impact of single currency on trade thus, if there are trade benefits to be derived from the proposed single currency in ECOWAS.

As a result, the study aims to contribute to the key issues of the pros and cons of probable monetary integration in WAMZ. Specifically, the thesis examines the economic conditions for successful monetary integration in WAMZ and assesses the trade generating effect, as this has not been sufficiently looked at. The findings of this study have important policy implications such that it may guide policymakers about the feasibility and prospects of potential monetary union in WAMZ.

In this context, this study attempts to answer the following two research questions: (1) Is WAMZ an optimal currency area – have WAMZ economies attained adequate macroeconomic shock symmetry for a common monetary policy to suffice? (2) What is the effect of a single currency - the CFA franc - on bilateral trade?

In order to answer the first research question, this thesis uses several statistical examinations on whether the WAMZ satisfy the essential OCA condition for a monetary union - macroeconomic shock symmetry. These include (a) first, it assesses the behaviour of the real effective exchange rates (REER) across WAMZ countries by estimating the long-run and short-run relationships between the REER and its determinants using time series. The model would provide a benchmark to derive the equilibrium REER and misalignments for these countries. The aim is to assess whether the impact of common fundamentals on REER is similar across WAMZ economies and to determine if their REERs are converging towards the equilibrium path, respectively. Second, we use a structural vector autoregression (SVAR) model to investigate how REERs respond to a shock to the REER determinants (oil price, productivity and demand shocks) across WAMZ countries. Overall, the analysis aims to assess whether WAMZ economies have attained adequate macroeconomic symmetry for a common monetary policy to suffice so that the costs of these countries giving up the autonomy of monetary policy and the nominal exchange rate are minimised.

The second research question (i.e., the potential effect of currency union on trade among WAMZ countries) is examined by focusing on the existing currency union, the CFA franc zone in ECOWAS, and estimating its effect on bilateral trade. The conclusion would indicate whether the CFA franc zone trade generating effect provides a strong case for the WAMZ single currency programme. This thesis uses a panel gravity model to answer the second research question by addressing all treatment effects identified in the literature – zero trade data and unobserved country-pair characteristics.

1.4 Main findings

The section briefly outlines the main findings of the study. Chapter 4 answers the first research question. The chapter provides a contemporary examination of the degree of macroeconomic shock symmetry by assessing the behaviour of the real effective exchange rates (REER) across WAMZ countries. The first part of chapter 4 investigates the long-run and short-run relationships between the REER and its determinants using a country-by-country Vector Error Correction Model (VECM) over the period 1980-2015. We further derive the equilibrium REER and misalignments for these countries to examine whether they are converging over time towards the equilibrium.

Overall, productivity differentials, terms of trade, real oil price, government consumption and trade openness are found to be important determinants of REER in the long run in WAMZ. However, the significant impact of the common fundamentals on REER is different across economies. Also, the country-specific short-run adjustment factor shows that there is REER mean reversion in 3 countries, but the speed of adjustment varies across candidate countries. Furthermore, the computed REER misalignments suggest that before 2007, the REER of WAMZ members experienced high divergence from equilibrium path. However, the degree of REER misalignments appears to diminish, converging towards equilibrium between 2007-2015.

The second part of chapter 4 imposes long-run restrictions to identify three types of shocks - oil price, productivity (supply) and demand preference shocks - from exchange rate determinants using the structural autoregressive model (SVAR) over the period 1980-2015 and assess how REERs respond to these shocks to characterise asymmetry across WAMZ. This is one of the novelty features of the study. From the impulse response analysis, there appear to be marked differences in the effects of the oil price shock among the WAMZ countries REER. Whereas real oil price shock leads to a real permanent appreciation in Nigeria, Guinea and Ghana, the contrary is observed in The Gambia and Sierra Leone. The response of REER to supply (productivity) shock across the five countries are also asymmetric. The response of REER to domestic aggregate demand shocks are positive for all the countries, but they

differ in size and speed; indicating idiosyncratic aggregate demand shocks. In the case of the variance decomposition, the sources of REER variability are idiosyncratic, and they vary significantly across countries.

The overall evidence from the empirical investigation points to heterogeneous economies. The findings imply that, in the absence of an alternative adjustment mechanism (such as fiscal transfer schemes), a move towards monetary union will be associated with a high cost to the countries in a world where a monetary response to a shock is immediate. Idiosyncratic shocks imply the need for different policy responses to adjust to macroeconomic shocks. This strengthens the case for policy autonomy in the region and is consistent with previous studies showing considerable economic divergences amongst WAMZ countries as the main constraint to monetary union.

Chapter 5 assesses whether the CFA franc trade effect provides a strong case for the WAMZ single currency programme. Unlike earlier studies, we estimate a panel gravity specification, allowing for country-pair and year-fixed effects of a comprehensive data set of bilateral trade flows of the 15 ECOWAS member countries over the period 1980-2016. The country-pair dummies control for heterogeneity since they account for any unobserved characteristics of each pair of countries that simultaneously explain trade volumes between them. The chapter also estimates the gravity equation by controlling for zero-trade values by adding a constant to each trade value to utilise the full sample, including zero trade flows in a log-linear estimation.

The chapter reached two main conclusions: First, estimates from the preferred gravity equation indicate that members of the CFA franc zone have promoted bilateral trade among members by 60%. A Poisson pseudo-maximum likelihood (PPML) estimation reinforces the hypothesis that the CFA franc zone augments bilateral trade among member countries. Second, the chapter reports a significant ‘trade creating effect’ in the CFA franc zone. The findings support the hypothesis that currency union increases bilateral trade, which is a helpful guide for a WAMZ monetary union.

1.5 Structure of the thesis

The thesis is divided into six major chapters. Chapter 1 looks at the research background, motivations, questions and the main findings. Chapter 2 discusses the theoretical development and methodological debate on monetary integration to motivate the approach for this research. This includes discussion of the OCA literature, which forms the basis for the analysis in this thesis. The final sections of the chapter considered the costs and benefits of monetary integration and the methodological discussions on operationalising the OCA theory.

Chapter 3 provides an in-depth historical background to the thesis, exploring monetary developments since the pre-colonial era and their relationship to intra-West African trade. The rationale of the chapter is that an understanding of historical monetary developments would provide an understanding of currency monetary arrangements in West African.

Chapters 4 answers the first research question outlined above: Is WAMZ an optimal currency area? In other words, has WAMZ economies attained adequate macroeconomic shock symmetry for a common monetary policy to suffice? We used several modern time series econometric techniques, such as cointegration, error correction models, and variance decomposition in a country by country framework, for six West African countries, to examine the degree of asymmetries among the WAMZ countries. In chapter 5, we answered the second research question of the thesis: What is the effect of a single currency - the CFA franc - on bilateral trade? This research question plays a crucial role in determining the benefits to be derived from the proposed currency union in ECOWAS. This chapter uses the gravity model for a panel of fifteen West African countries. Various estimation methods are employed to establish the effect of currency union on bilateral trade.

Finally, chapter 6 concludes providing a summary of key findings of the entire thesis, some policy implications and pointing out possible scopes of future research.

Chapter 2 Developments of monetary integration: Conceptual issues and methodology

2.1 Introduction

This chapter aims to discuss some of the main conceptual issues and approaches related to monetary integration to motivate the approach in this thesis. We thus start with a brief survey of developments of economic integration in section 2.2. In section 2.3, we discuss the main conceptual issues in evaluating monetary integration. This revolves around the workhorse theory – optimal currency area (OCA) - for assessing the likely success, or the cost and benefit of monetary union for a given region. Section 2.4 presents the arguments of the new OCA literature, which emerged as an outgrowth of the weakness and limitations of the early OCA theory. The final section, 2.5, reviews the methodological approaches in terms of operationalising the OCA theory. The review is useful to provide an explicit underpinning model for the research on how the cost and benefits of WAMZ single currency are estimated.

2.2 Economic integration

Conceptualising economic integration has tended to prove somewhat a challenging task, because various attempts have been made, leading to a proliferation of definitions in the literature (Viner 1950; Tinbergen 1954; Meade 1955; Balassa 1961; Robson 1987).[7] Tinbergen (1954: 95) defines economic integration as the "creation of the most desirable structure of the international economy, removing artificial hindrances to the optimal operation and introducing all desirable elements of coordination or unification deliberately". Balassa (1961: 4) see economic integration as "a process" (involving various measures abolishing discrimination between economic units belonging to different countries) and "a state of affairs" (the absence of various forms of discrimination

[7] The proliferation has led to the interchangeable use of the term regional integration with economic integration and so forth. This research is concerned with the latter term

between national economies). Besides, Rodrik (2000) reiterates the natural benchmark for thinking about international economic integration is to consider a world in which markets for goods, services, and factors of production are perfectly integrated.

Contrasting these definitions can be difficult because they are interconnected. This interlink has resulted in a broad consensus on three critical issues of economic integration: (a) Removing internal barriers to business and economic activity amongst the integrating countries. (b) Cooperation or coordination for efficient utilisation of resources; intending to produce a broader and more open economy expected to benefit member countries. (c) Free movement of goods and factors of production within the integrated area. In Africa and other developing areas, economic integration, in general, means more than measures designed to abolish trade barriers. It is conceived and adopted as a useful instrument for economic growth and development and a tool that would enhance their bargaining position in the global system (Obuah 1996).

Notwithstanding, there are various forms of economic integration representing varying degrees of integration of economic policies as per the objective of the group (Biswaro 2012). Traditionally, the Balassa (1961) levels of economic integration are distinguished as a sequencing pattern towards closer integration: **I.** In a preferential trading arrangement (PTA), trading blocs give preferential access to specific products from the participating countries. This is managed by reducing tariffs but not by abolishing them altogether. **II.** A free trade area (FTA) is an agreement among countries where all tariffs and other quantitative restrictions between the participating countries are abolished, whereas each country has the autonomy in setting their tariffs on trade with non-member countries. **III.** In a customs union (CU), participating countries not only remove tariffs and quantitative restrictions on their internal trade but also introduce a common external tariff (CET) on trade with non-member states. **IV.** In a common market (CM) both trade restrictions and restrictions on factors of production-labour, capital, and enterprise, are abolished. **V**. An economic union (EU) combines the suppression of restrictions on commodity and factor

movements with some degree of harmonization of economic, monetary, fiscal, social and other policies.[8]

The main criticism of the above is that at present, some economic integration exists with a range and variety of rules far richer than these traditional distinctions (Baldwin and Venables 1995; Baldwin and Wyplosz 2015). The reason is that the conventional forms of regional integration have focused mainly on trade integration. However, the concept of deep integration went beyond trade with its focus on policy harmonisation in the 1980s, which came to include monetary integration (Pomfret 2005). Monetary unification presupposed trade integration as the first step in the regional integration sequence. In other words, it is only found in conjunction with a customs union or a common market. Robson (2010) argues that the sequencing of integration becomes a problem as to whether monetary integration precedes or follows economic integration. For instance, in West Africa, the CFA franc zone was established before reaching customs union in 2000, whereas the Eurozone is a natural outgrowth of the European Union. Nonetheless, the significance of monetary integration in the process of economic integration is to provide an economic system that facilitates the external payments, and the most ambitious way of doing this project is to establish a common currency to replace individual national currencies (Machlup 1977). Robson (2010) maintains that there is no compelling reason to follow the sequence rigidly. The focus of this research is on the development of monetary union; therefore, we start the next section by reviewing the theory of monetary integration.

2.3 Monetary integration and the OCA Theory

Throughout history, many academic papers have been written on monetary integration, yet there is no generally accepted definition of monetary integration (Balassa 1961; Tavlas 1993; Robson 2010). Nonetheless, there are two essential characteristics: the exchange rate must bear a permanently fixed relationship to each other in the integrated area and full convertibility among

[8] The highest form of economic integration is total economic integration which assumes the unification of monetary, fiscal, social and counter-cyclical policies and requires the setting-up of a supranational authority whose decisions are binding for the member states (Balassa 2013).

national currencies within the region (Kawai 1991). A great deal of the literature on monetary integration revolves on the theoretical work of OCAs pioneered by (Mundell 1961; McKinnon 1963; Kenen 1969). This provides the framework for evaluating the real consequences of monetary integration for integrating countries. Though the theory was a purely academic exercise during the 1960s, an interest in it was revived to bolster the European monetary integration (EMU)[9] in the 1990s. Subsequently, culminating in the award of the Nobel Prize in Economics to Robert Mundell in 1999. This thesis will, in part, draw upon the theoretical foundations of the OCA to assess the potential success of a currency union in WAMZ.

In section 2.3.1, we discuss the background debate between fixed and flexible exchange rates in its specific relationship to the OCA theory. In section 2.3.2 the main elements of the OCA theory; the conditions under which a country should participate in a currency union. We conclude the section with the weaknesses and criticism of the OCA theory in 2.3.3.

2.3.1 Fixed vs flexible exchange rates

The literature of OCAs emerged as an outgrowth of the debates over the relative merits of fixed versus flexible exchange rates (Tavlas 2009; i Marco 2014). The early 1960s was characterised by the Bretton Wood fixed (but adjustable) exchange rates and limited international capital flows. Most countries at the time, had fixed their currency to the US Dollar and the US Dollar was convertible at a fixed rate into gold (Horvath 2003). In addition, was the incipient process of economic and monetary integration among the members of the European Economic Community (EEC) (Mongelli 2002)[10].

The context of the debate relates to the appropriate exchange rate regime at which to restore equilibrium in the balance of payments. The debate on whether

[9] Much of the theoretical and empirical literature reviewed here focus on the creation of a single European Currency rather than WAMZ currency. However, this will not adversely affect the study, since the evaluation of the empirical literature is undertaken to evaluate and define appropriate practical methodologies for the current research rather than gain any insight into the success or otherwise of the Euro. Furthermore, the study will also provide a review of the existing literature with a focus on WAMZ.

[10] A proposal for economic and monetary union among the members of the European Economic Community (EEC) is first mentioned in the Marjolin Memorandum (Mongelli 2008).

to fix or float have their virtues and vices. Friedman (1953) argued that any possible error in economic policy might be straightened out by continuous and smooth changes in the exchange rates. He suggested that in order to maintain both internal and external balance, countries with wage and price stickiness should adopt flexible exchange rates. Even if adjustments of domestic wages and prices are possible, changes in nominal exchange rates are likely to be a more efficient way of effecting competitiveness adjustment than the revision wages and prices. In a nutshell, Friedman did not attempt to balance off the benefits and costs of floating; instead, his argument in favour of flexible exchange rates left the general impression that any country should adopt flexible exchange rates, irrespective of its economic characteristics (Tavlas 1994).

In contrast to the benefits, free-floating is argued to stimulate speculation, uncertainty, and instability. Any adjustment in case of external shock would have an impact on home prices. Its consequences would be swifter in the countries which have a relatively high degree of openness (Jovanović 2005).

On the other hand, the arguments in favour of fixed exchange rates are those that justify the introduction of monetary unions, in effect the OCA theory. A summary of the distinction between monetary unions and other pegged regimes within the context of an OCA consistent with Corden (1972), Robson (1998), Meade (2009) and Kenen and Meade (2010) is summarised in Table 2.1. The OCA analysis sought to delineate a single-currency domain within which monetary and fiscal policies, and adjustable exchange rates, could be used simultaneously to achieve full employment, a stable internal price level, and balance-of-payments equilibrium (Tavlas 1993). The OCA literature has become a benchmark for evaluating the likely success of a currency union for a given region. We present the various criteria for monetary integration and the economic costs and benefits thereof in the next section.

Table 2.1 Characteristics of different forms of monetary integration

Characteristics	Informal exchange-rate union (Pseudo-union)	Formal exchange-rate union	Full monetary union
Between members:			
Current account convertibility	Yes	Yes	Yes
Capital market integrated	Yes	Yes	Yes
Exchange rate fixed	Yes (within margins)	Yes (zero margins)	Yes (zero margins)
Currencies	Separate	Separate	Single
Central banks	Multiple, independent	Multiple, strongly coordinated	Single
Reserve pooling	No	Yes	Yes
Foreign-exchange market intervention	Separately	By single agency	By single agency

Source: Adapted from (Cobham and Robson 1994: 241)

2.3.2 The main elements of OCA theory

An OCA can be defined as the optimal geographical area for a single currency, or for several currencies, whose exchange rates are irrevocably pegged to one another with unlimited convertibility for both current and capital transactions, but whose exchange rates fluctuate in unison against the rest of the world (Mundell 1961). The optimum geographical area is a region where borders are defined by the sovereign countries choosing to participate in the currency area.

Optimality concerns various OCA properties - also called "prerequisites," "characteristics," "criteria" by some authors - that are likely to determine whether it makes sense for a group of countries to give up their national currencies for a common currency with other countries in a monetary union. The series of criteria is a combination of economic and political factors: shock symmetry, factor mobility, degree of openness, product diversification, level of

fiscal integration and inter-regional transfers, degree of policy integration, similarity of inflation rates, price and wage flexibility, real exchange-rate variability (Mundell 1961; McKinnon 1963; Kenen 1969).

i. The similarity of Shocks and Business Cycles

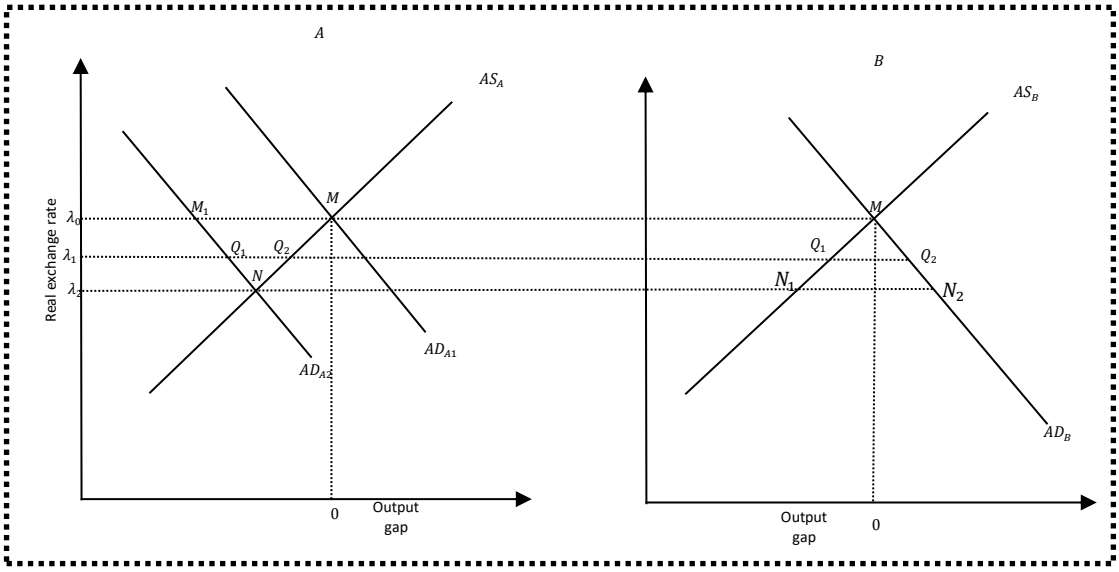
According to the OCA literature, one of the important criteria is the degree of asymmetry of macroeconomic shocks (Mundell 1961; McKinnon 1963; Kenen 1969). The reason is that participating in monetary union implies giving up the nominal exchange rate and monetary policy autonomy for correcting country-specific shocks, and the costs associated with the loss of monetary policy independence increase with the degree of shock asymmetry between countries. We can illustrate this using a two-country scenario (country A and B) with the assumption of sticky prices in the short run. First, if both countries have identical business cycles and experience identical or similar shocks, for example, a negative demand shock that is common to both countries, then a common policy response in the form of a common monetary will suffice (Bayoumi and Eichengreen 1992; Pisani-Ferry 2013). A depreciation of the common currency against the rest of the world would be an ideal policy that will fit the two countries' problems. Therefore, the more symmetric the structural shocks, the better countries are suited for a common currency area.

However, in the presence of asymmetric shocks, the solution becomes complicated for the common central bank. This is demonstrated using Figure 2.1, where the vertical axis shows the real exchange rate. With both countries at equilibrium at M with 0 output gap, we assume that country A is hit by a negative aggregate demand shock leading to a shift in aggregate demand curve from AD_{A1} to AD_{A2}. Country A would need a depreciation of its real exchange rate with both country B and the rest of the world, but B needs no change since it is still at the initial equilibrium point M. Given A was not in a monetary union, the country will depreciate its nominal exchange rate, either through devaluation or decrease in interest rate, to achieve a real exchange rate of λ_1 and a new equilibrium at point N. In a monetary union, country A gives up the exchange rate and interest rate instruments to smooth out idiosyncratic shocks. Hence,

only the supranational central bank has the power to resolve the problems for both countries. In such a situation, a single monetary policy would result in country-specific inflation and have destabilising pro-cyclical effects, constraining the monetary union bind (Bayoumi and Eichengreen 1992; Pisani-Ferry 2013). This weakens the case for a common currency, as it may be useful to alter the exchange rate for stabilisation purposes or to implement independent monetary policies if shocks are highly idiosyncratic. It is worth mentioning that asymmetry may result from differences in shocks (impulses) or economic structures (responses) (Buiter 1997). When countries that are significantly different, form a monetary union, the monetary policy dilemma of the common central bank goes beyond asymmetric shocks because symmetric shocks with the asymmetric response equally posed the same problems as shown in Figure 2.1 below (Kamara 2015). This has been widely understood in the literature as the main costs involved when countries participate in a monetary union (Mundell 1961; McKinnon 1963; Kenen 1969).

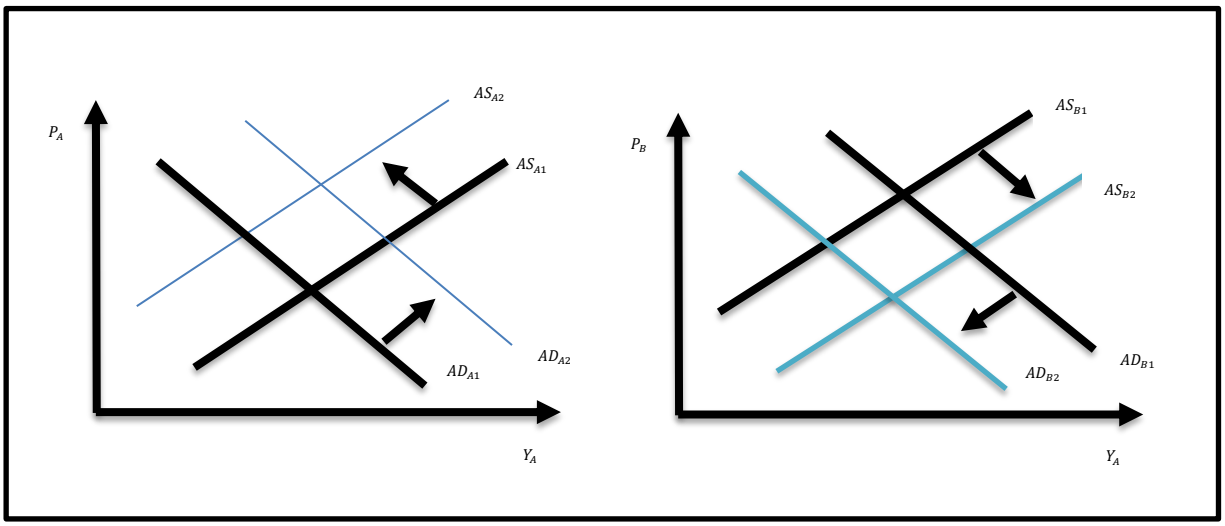
However, there is also a different perspective wherein a currency area; countries could smooth country- or region-specific shocks with efficient adjustment mechanisms that help restore equilibrium. The other adjustment mechanisms as an alternative to the exchange rate needed to cope with a country- or region-specific shocks are discussed below. The underlying reason is that a high degree of institutional and structural convergence among the countries beforehand minimises the risk of asymmetric shocks, are most likely to constitute an OCA (Mongelli 2002).

Figure 2.1 Adjustments Process in Mundell Model/ Asymmetric shocks



Mundell (1961) identified alternative factors - the key attributes of an optimum currency area - in correcting external imbalances other than using nominal exchange rates suggested earlier by Friedman (1953). We can represent his idea using a two-country and two-good in a world with an initial balance of payments equilibrium. We illustrate in Figure 2.2 show an increase in demand in country A (due to an asymmetric shock in aggregate demand) would create excess demand in A and excess supply country B. Mundell then put forth two criteria that would restore equilibrium when these two countries are in currency union: First, wage flexibility in both countries can restore equilibrium without bringing about any sustained unemployment in one country and or inflationary pressures in another. When wages are flexible between countries contemplating a single currency, the excess demand for labour in country A will push the wage rate upward, and the unemployed labour in country B will accept a lower wage claim. The increase in wage in A will shift the aggregate supply from AS_{A1} to AS_{A2} and the lower wage in B will increase aggregate supply shifting the AS curve from AS_{B1} to AS_{B2}. As a result, increased AS in country B will lead to a decrease in the price level and hence B product will become more competitive relative to A, which will stimulate demand. Also, the decline in AS in A will increase the price level, making A products less competitive relative to B's, reducing demand in A. These corresponding shifts restore the equilibrium positions in both countries.

Figure 2.2 Adjustments Process in Mundell Model/Automatic adjustments inflexible factors



labour mobility between the two countries, then the unemployed labour from B will move to A where the demand for labour is in excess. With this movement, there will be no more unemployment in B and the inflationary wage pressures A will disappear. Thereby, factor mobility is a crucial attribute of an OCA since it provides a substitute for exchange rate flexibility in correcting external imbalances. Therefore, a currency area is thus optimal if all participating countries or regions have flexible wages or mobility of labour and capital. If these criteria are not fulfilled, a system of flexible exchange rates is preferable (Volz 2010).

However, Kenen and Meade (2010: 14) argue that it is utterly unrealistic to assume that workers will move quickly from one country to another, even if there are no border barriers. Hence, labour mobility is likely to be low, due to significant costs, such as for migration and retraining (Mongelli 2002b; Mongelli 2008). The implication is that labour mobility is a less adjustment mechanism within a currency union (Jovanović 2005). On the other hand, Mundell failed to distinguish between labour mobility and capital mobility in his initial analysis: Goods moved freely between countries in his two-country model, but bonds and other claims did not.[11] This limits the relevance of Mundell's argument Crawford (1993).

iii. The degree of economic openness

McKinnon (1963) introduced the idea of openness and trade integration as a key characteristic of an optimal currency area. He defined openness as the ratio of tradable (goods that can enter foreign trade) and non-tradable goods (goods that do not enter foreign trade because transportation is not feasible for them). McKinnon (1963) examined the effects of a shock that changes the relative price of tradable and non-tradable on the overall price level. When economies are relatively open, variable exchange rates cause a significant

[11] While capital mobility was more limited in the early 1960s, when Mundell wrote his paper, it is sensitive to the degree of economic activity and the outlook for economic prosperity now (Jovanović 2005). As a result of free capital markets in the world, capital tends to flow from regions with low yields on assets to ones yielding higher returns, and this phenomenon may have effects in restoring equilibrium.

direct and indirect effect on internal price. When the domestic currency depreciates against trading partners, the price of tradable will rise relative to non-tradable to destabilise the general price level. Also, a devaluation would be more rapidly transmitted into the domestic price and cost of living, negating its intended effects. This would, in turn, reduce the potential for money, and hence money illusion would not be much help in getting labour to accept a cut in real wages (McKinnon 1963).

To stabilise the general price level and the depreciating exchange rate, the authorities would require a contraction in demand to push down the prices of non-tradable. Other things being equal the degree of openness plays a crucial role here. The more open an economy is, the larger the share of tradable in output, and the more reduction in demand is needed to restore equilibrium. McKinnon noted that the greater a country's openness, the smaller the chances for the effective independent use of exchange rates as an instrument for economic stabilisation. The implication is that flexible exchange rate would be less effective as an adjustment instrument for redressing the trade balance and stabilising prices for more open economies. As such, when countries lose such a tool, through a fixed exchange rate or currency union bears the less cost to the economy (Corden 1972).

These and other considerations led McKinnon to conclude that: (a) relatively open economies should peg their currencies, and (b) open economies that trade extensively with one another would find it beneficial to form a currency area because such an area would be closer than any of its constituent parts, thereby providing a greater buffer against the effects of exchange-rate changes (Tavlas 1994).[12] Jovanović (2005) submits the reason the openness argument fails to explain why small EU states such as Denmark and Sweden have internal control over their exchange rate despite strong trade relations with the EMU, likewise, why relatively large countries such as Germany and France opted for the EMU, while Britain is still out of it.

[12] Also, small economies need to link their currencies with the currency of their major trading partner, as a small economy is less likely to efficiently produce all the products it needs (Tavlas 1993; Mongelli 2002). For instance, when former colonies link their currency to that of their former master (for example, the CFA franc zone) or when some of the transition economies of Central and Eastern Europe linked their currencies to the German mark, as was the case during the 1990s (Jovanović 2005).

iv. Product diversification

Kenen (1969) presented the concept of product diversification to assess the possibility of a currency union. Though the paper included several arguments such as fiscal integration and product structures, product diversification became the standard component of the optimum-currency-area literature. The paper argues that highly diversified economies in production and consumption, are better candidates for currency areas than less-diversified economies. When countries are susceptible to sector-specific or industry-specific shocks, diversification provides some insulation, averting the need for prompt adjustment in terms of trade via the nominal exchange rate (Tavlas 1994). They are more likely to incur fewer costs for abandoning nominal exchange rate changes and thus, find a single currency beneficial.

Furthermore, when a well-diversified economy confronts a drop in the demand for its principal exports, unemployment will not rise as sharply as it would in a less-diversified national economy. On the other hand, Kenen (1969) highlights the importance of using policy instruments - monetary and fiscal restraint - in countries that have a low degree of product diversification to cope with asymmetric external demand shocks. The implications for developing countries, especially WAMZ are that: “being less diversified and less well equipped with policy instruments, [they] should make more frequent changes or perhaps resort to full flexibility [of the exchange rate]” (Kenen 1969: 54).

v. Similarities of inflation rates

One criterion for an OCA is the similarities of inflation rates among the potential member countries (Fleming 1971). External imbalances can arise between countries joining a currency area from persistent differences in national inflation rates. Countries with external balance surplus would be forced to accept an undesirable inflation rate, whereas countries with external balance deficits would be forced to accept an undesirable level of unemployment. Fleming (1971) remarks that when inflation rates between states are lower or similar

over time, terms of trade will also stay somewhat stable. This will, in turn, give rise to equilibrium current account transactions and trade, and reduce the need for nominal exchange rate adjustments (Tavlas 1993). As a result, WAMZ macroeconomic convergence criteria provide a single-digit satisfaction for the potential member countries.

vi. Fiscal integration

Kenen (1969) proposed fiscal integration as a characteristic to judge optimality for participation in a single currency area. He argued that the higher the level of fiscal harmonisation between two areas, the greater the ability to smooth out diverse shocks through fiscal transfers from a low unemployment region to a high-unemployment region. The fiscal transfer system can be a significant tool to redistribute funds to cushion individual countries or regions affected by an adverse asymmetric shock (Baimbridge and Whyman 2015). Such an adjustment mechanism could be, for instance, a unified budget, which automatically redistributes from countries or regions experiencing a strong economy to those suffering from a recession.

This is against the backdrop that the absence of nominal exchange rate adjustments, labour mobility is unlikely to facilitate the adjustment process. Fiscal transfers are part of a non-market-based adjustment process. Tavlas (1993) argues that fiscal harmonisation would require an advanced degree of political integration and willingness to undertake such risk-sharing. This calls for the need for political or fiscal unions. The importance of fiscal adjustment mechanisms is demonstrated by the US economy, which has a highly federal fiscal system that contributes to regional stabilisation in the case of asymmetric shocks. De Grauwe (2000), however, points out that fiscal transfers are hence only suited to dealing with temporary demand shocks; when the shock is a permanent one, other adjustment mechanisms will be necessary to deal with the problem.

Besides, the recent economic crisis in the eurozone has reinforced the need for currency union participants to refrain from running excessive budget deficits and not carry the burden of large debts as this could destabilise the single currency.

vii. Political integration

Mintz (1970: 33) suggests that “the major, and perhaps only, the real condition of the institution of monetary integration is the political will to integrate on the part of the prospective members”. Political will fosters, amongst others, compliance with joint commitments sustains co-operation on various economic policies and encourages more institutional linkages between members (Mongelli 2002). Along similar lines are the willingness of prospective members to give up their independence or sovereignty in monetary policies (Machlup 1977). Haberler (1970) and Tower and Willett (1976) stress the importance of similarity of policy attitudes among member countries in turning a group into a successful currency area. Countries with a reasonable level of compatibility in preferences toward economic outcomes; such as low inflation, high employment and their ability to trade-off between these goals make them successful candidates for monetary union.

In summary, countries forming a monetary union must have a shared sense of common preferences that outweighs the national interest. This point is becoming increasingly apparent in the European Union and other economic unions, that political factors are important in determining the success of a single currency area (Tavlas 1993). The political factors in each country that determine the optimality of WAMZ as a currency area are different. Whereas five countries are eager and willing to enter into a single currency, it is not the case in Nigeria. One fundamental concern for the CFA franc zone – having a substantial backing from France – is whether members would agree to let go of the CFA for a West African single currency. However, this thesis focuses only on economic and not political issues.

2.3.3 Weaknesses and limitations of the OCA theory

The early OCA literature discussed above tends to give the preconditions countries must satisfy before joining a currency union. However, the early theory has been criticised for being inconclusive and inconsistent (Tavlas 1993). For instance, McKinnon (1969) pointed out an inconsistency between his

openness criterion and Kenen's (1969) diversification criterion.[13] Mundell (1961) even argued that it was by no means evident that diversification could be used to choose among exchange-rate regimes. Also, Robson (1987) and Tavlas (1994) observe that several properties are difficult to be measured unambiguously. In effect, OCA properties were difficult to be evaluated against each other since they lack a unifying analytical framework. Perhaps the most trenchant criticism was the crumbling of the main theoretical foundation of the OCA -the long-run ineffectiveness of monetary policy (Mongelli 2008).

As a result, the OCA theory began to recede from the academic discussions during the 1970s. At the same time interest in European monetary integration subsided in the 1970s after the demise of the Bretton Woods arrangement (Mongelli 2008). Against this backdrop, the works of Fleming (1971), Corden (1972) and Tower and Willett (1976) revised the OCA theory with greater emphasis on the evaluation of the benefits and costs of currency area participation. The next section considers developments of the new OCA theory.

2.4 New Optimal Currency Area theory

The theory of OCAs was resuscitated as a subject of active interest in the early 1990s due to the progress made toward European monetary integration. As observed, the early development of the OCA literature focused on the reduction of losses via the possibility for adjustment through alternative means in case of shocks. The modern OCA theory writers instead, using theoretical developments from various economic branches, stopped focusing on the main costs of joining a monetary union and placed more emphasis on the benefits, especially within the European Union (Broz 2005). Such theoretical developments include; rational expectations, time inconsistency and credibility issues and exchange rate determination models (Tavlas 1993).

So, considering that the new OCA theory tries to explain the monetary values and benefits of monetary integration, in line with the economic developments,

[13] First, McKinnon's openness criterion and Kenen's diversification principle lead to contradictory implications about the optimal exchange-rate regime; the former criterion suggests that open economies (which are likely to be relatively undiversified) should peg their currencies, whereas the latter criterion postulates that undiversified economies should float their currencies against the rest of the world (Tavlas 2009).

we commence with the costs and benefits analysis in section 2.4.1. This is followed by the monetarist critique of monetary policy, time consistency and credibility issues and the effectiveness of exchange rate adjustments in section 2.4.2, 2.4.3, and 2.4.4, respectively. We finally extend the discussion to include the endogeneity of OCA debate in section 2.4.5.

2.4.1 Cost and Benefit analysis

The previous section considered the fundamental criteria countries must satisfy to become an optimal currency area (OCA). Other researchers, on the other hand, argue that the focus should be on the relative costs and benefits of participating in a currency union for each country (Tower and Willett 1970; Ishiyama 1975). The potential benefits of joining or forming a monetary union can be categorised into efficiency and credibility gains (Kenen and Meade 2010). While the main cost of monetary unification is giving up of individual member country's monetary and exchange rate policy instrument. Therefore, this section provides the potential benefits and costs that countries derive from joining a currency union.[14]

i. Benefits

Efficiency gains-Reduction in transaction costs and exchange rate uncertainty: At the micro-level, the direct efficiency gains are assumed to arise from the reduction in transaction costs and the elimination of exchange rate uncertainty (i Marco 2014). Mundell (1961) argues that a single currency is more efficient than multiple currencies in performing the roles of medium of exchange and unit of account. The prices of currency conversion increase if there are many currencies under flexible exchange rates within a region (Mongelli 2008). In ECOWAS, six countries belonging to WAMZ have their national currencies that are inconvertible within the region. Hence, the removal of currency conversion costs, information costs and discouraging price discrimination via a single

[14] De Grauwe (2016) provides a critical textbook review of the costs and benefits of the monetary union. An extensive review is also available in Emerson et al. (1992).

currency can facilitate trade in goods and services between countries otherwise with different currencies.

Assessing the potential aggregate transaction costs savings from the removal of currency conversion associated costs for WAMZ countries is high, but it is hard to offer a precise estimate due to the absence of aggregate bank data on WAMZ exchange rate transactions. In the case of EMU, gains from removing foreign exchange transaction costs were estimated to be 0.4% of the group's GDP (EU Commission, 1990). Minford (2002) indicates that the modesty of the savings on transaction costs is because the bulk of transactions within the European Community go through the banking system occurring limited or no currency conversion costs. In the case of WAMZ economies, such savings are likely to be higher due to the underdeveloped financial systems, where many transactions in the informal sector and between SMEs are in cash.

In addition, a common currency removes the exchange rate risks associated with floating exchange rates. The argument implicitly assumes that exchange rate volatility has a negative effect on economic condition (Horvath 2003; i Marco 2014). A common currency precludes future competitive devaluations, facilitates foreign direct investments and removes the non-tariff barriers to trade in goods and services which may encourage more trade (Volz 2010). Moreover, the efficiency gain brings a high degree of long-term confidence in future investment decisions; which ultimately drive private sector growth (Kenen and Meade 2010; Volz 2010). Trade benefits are likely to increase with the degree of openness of an economy (McKinnon 1963).

Accordingly, the magnitude of these direct gains is dependent on the level of intra-regional trade and investment. Though the literature following Rose (2000) finds positive trade impact of a currency union, the potential gains are often likely to be somewhat limited in the case of WAMZ because of the relatively small levels of intra-regional trade. Chapter 5 assesses the potential trade-creation in the region. On the other hand, other studies argue that exchange rate risk can be hedged relatively quickly in the forward foreign exchange market reducing the associated costs on international trade and foreign investment (Kenen and Meade 2010). However, hedging is expensive and

complicated, especially in developing countries where such financial instruments are often impossible even for shorter periods due to the underdeveloped financial markets (De Grauwe and De Bellefroid 1986; Volz 2010).

Credible Monetary Policy and a Lower Inflation Bias: Monetary unification means giving up monetary policy as an instrument for the stabilisation of country-specific economic shocks. One important reason for joining a monetary union, especially for countries with high inflation, is that this offers a route to low and stable inflation, provided the monetary authority can commit to monetary rules (De Grauwe 1997). In a monetary union, a central bank with active statutory duty for price stability and political independence provides a consistent and credible anti-inflationary policy (Emerson 1992).[15] Hence, monetary unification becomes a trade-off between reduced stabilising country-specific shocks and enhanced credibility of monetary policy resulting in a lower inflation outcome. When countries have full discretion to set monetary policy there is a possibility of inflation bias.[16] According to Beetsma and Giuliodori (2010), the incentive for the central bank to relax monetary policy is particularly strong when the central bank is under the influence of a government that wants to reduce unemployment. However, there is no empirical evidence from the Phillips curve argument that higher inflation can be exploited as a means of securing economic policy objectives (such as low unemployment), except for short-run periods (Emerson 1992). On the other hand, by coordinating monetary and fiscal policies, the currency area will bring a more significant monetary and price stability, considered as the prerequisite for economic growth (Dornbusch 2001; Beetsma and Giuliodori 2010).

In a summary, given that floating exchange rates can be very volatile and that this volatility can have essential repercussions when a country engages in international trade, it tends to support WAMZ economies quest for an alternative

[15] So far, the ECB has by wide and large met its objective of keeping area-wide inflation close to 2 percent. Those euro-zone members with a history of weak monetary discipline benefited from a substantial reduction in inflation and inflation expectations have become low, which suggests that the anti-inflationary stance of the ECB is credible (Beetsma and Giuliodori 2010).

[16] The problem of the "inflation bias" has been studied in numerous contributions following the seminal work by Barro and Gordon (1983).

exchange rate regime that could provide the stability and credibility that a fixed exchange rate system had been intended to provide (Meade 2009).

ii. Costs

The main cost of monetary unification is the loss of monetary independence, and often, placing pressure on national fiscal policy. In a monetary union, the management of monetary policy and the exchange rate is transferred to a supranational central bank. As a result, individual member countries lose direct control over these instruments (such as interest rate and nominal exchange rate), that may be useful in dealing with country-specific macroeconomic shocks (Mongelli 2002). When countries face unexpected shocks, being domestic or foreign, the real and nominal macroeconomic variables often tend to fluctuate. The resulting variability of macroeconomic variables (such as output or inflation) is generally considered to be welfare-reducing and the disappearance of monetary policy tools, assuming it is instrumental in affecting macroeconomic variability, could, therefore, have implications in terms of welfare (Emerson 1992). On the other hand, Tavlas (1993) argues that the welfare implications or the magnitude of the costs depend on how these economies are vulnerable to shocks and the ease with which they can adjust. Accordingly, the greater the fulfilment of the OCA criteria prior, the less the need to use monetary policy tools when shocks hit countries.

Also, one difficulty structurally built into monetary union is the inability for members to devalue their currency for competitive advantage (Frankel 2013). Naturally, the temptation to devalue national currencies against the currencies of the main trading partners is stronger when the economy is in recession, and the need for preventing a rise in unemployment is highest. However, Beetsma and Giuliodori (2010) argue that policymakers today are more aware that devaluation can inflict a welfare loss in their own country, making them reluctant to engage in such a policy. Thereby, monetary unification effectively forces countries to coordinate their national policies, and countries achieve the same outcomes for output, but with lower inflation. This is evident from the current Euro-area financial crisis, while the EMU prevented any form of competitive

devaluations, it would have produced merely higher inflation and undermine cooperation among the EU countries in other areas (Beetsma and Giuliodori 2010).

Furthermore, in a monetary union, there is reduced the possibility for member countries to use seigniorage revenue (inflation tax). Seigniorage is the ability of the government to finance its expenditure by issuing/printing money, and it is a major source of government revenues, especially for economies suffering high inflation (Emerson 1992; i Marco 2014). The countries that intend to form a WAMZ/ECOWAS union suffer from chronic budget deficits and their inability to raise enough tax revenues make them rely at least in part on seigniorage revenues (Debrun et al. 2005; Beetsma and Giuliodori 2010). Hence, a loss in seigniorage revenue may impact negatively on a government's ability to finance social, health and education programmes, among others (Oshikoya 2010). Emerson (1992) argues that a reduction of seigniorage revenues eliminates a perverse incentive towards inflation and fiscal laxity; it should be a source of welfare gains whatever the gross public cost.

In conclusion, the traditional OCA theory has largely ignored the implications of monetary unification for fiscal policymaking. However, the recent developments in the eurozone debt crisis have provided a practical example of this type of cost in a monetary union. Monetary unification affects the interactions among the national governments with potential consequences for the monetary and fiscal policy mix and, thus, also the macroeconomic outcomes. Because fiscal policies are determined at the national level, the fiscal authorities may pursue different macroeconomic objectives than the monetary authorities. ECOWAS members have a track record of running significant budget deficits, especially during times of weak commodity export prices. It is generally considered that member countries carrying the burden of substantial debt could undermine the single currency. In effect, a fiscal expansion may produce harmful cross-border spillovers. For instance, the eurozone authorities had to intervene to bail out Greece (and, to a lesser extent, other Southern European countries) in the recent debt-refinancing problems. These complications with fiscal policy could present a rationale for some fiscal policy restrictions for member countries (Beetsma and Giuliodori 2010). The implications of fiscal policy restrictions

could be substantial for the ECOWAS members; as currently they rely heavily on fiscal policy as a tool with which to manage their economies. However, the degree to which the ECOWAS countries would be able to meet such fiscal discipline rules, the better the proposed currency union would be.

2.4.2 The Monetarist critique: long-run ineffectiveness of monetary policy

The early OCA theory discussed in section 2.2 was embedded in the belief that, at least in the short run, monetary policy is an effective policy instrument to attain an optimum point along the Phillips curve. This view implies that the loss of monetary policy instruments to undertake business cycle stabilisation[17] in a monetary union imposes a high cost on an economy (Corden 1972; Mongelli 2008; Tavlas 2009). Nevertheless, the monetarist critique and the literature on the inflation bias postulating the long-run ineffectiveness of monetary policy undermined this perception in the 1970s.[18]

Friedman (1968) pointed out that economic agents or labour tend to negotiate in terms of real rather than nominal wages; hence, the Phillips curve should be augmented by expected inflation. This results in a vertical long-run Phillips curve where there is no long-run trade-off between unemployment and inflation rates.

Consequently, monetary policy becomes ineffective in the long-run as the Phillips curve is displaced by the natural rate of unemployment (NRU) (McCallum 1989). The implication is that the best that macroeconomic policy can hope to achieve is price stability in the medium term (Friedman 1968). Hence, the expected costs of losing direct control over national monetary policy, implicit in early OCA theory, seem modest subject to the above conditions.

[17] The cost that is represented by wider cyclical fluctuations, is more severe when shocks are asymmetric vi's-à-is the other partner nations.

[18] See Lucas (1972), Kydland and Prescott (1977) and Barro and Gordon (1983).

2.4.3 Credibility and time consistency issues

Also, one of the preconditions for countries joining a currency area discussed above is the convergence or similarity of inflation rates (Fleming 1971). However, proponents of the modern OCA theory have argued that a country with a reputation of high inflation and a record of reneging low inflation commitment would find it hard to reduce inflation without a long and pricey process of disinflation. Kydland and Prescott (1977) and Barro and Gordon (1983) have argued that national monetary policy authorities often face time-inconsistency and credibility problems. This results in “inflation bias” - thus when the use of discretionary policy by policymakers create incentives for surprise inflation to reduce the short-run unemployment. Such reductions in unemployment come at the cost of higher inflation and lower credibility in the long run.

Beetsma and Giuliodori (2010) stated that this incentive is particularly strong when the central bank is under the influence of a government that wants to reduce unemployment. In such situation, commitment to time consistent policy rules are often hampered for political reasons, and the only practical alternative is to peg the currency to a country of a more efficient monetary practice (Giavazzi and Giovannini 1989; De Grauwe 1992). Alternatively, joining a monetary union, whose monetary policy entails greater credibility may carry benefits (Barro and Gordon 1983). In effect, a high inflation country can reach a low inflation reputation overnight by surrendering itself to the control of the low inflationary central bank without any cost from the loss of monetary policy control. In summary, the new OCA projects how monetary integration may be even more beneficial when the variance of inflation rates is high, thereby the similarities of inflation rates from the early OCA literature may not be a necessary precondition (Broz 2005). Clerc et al. (2011) state that many countries joined the EMU according to this logic.

2.4.4 The Effectiveness of Exchange Rate Adjustments

The view of the early OCA literature is that the nominal exchange rate acts as a useful adjustment tool in restoring external disequilibrium since exchange rates were thought to be influenced primarily by movements in trade flows (Tavlas 1993). Hence, the cost of losing direct control over the nominal exchange rate depends on the stabilising benefits of exchange rate flexibility.

The new OCA literature has argued that the loss of the exchange rate as a policy tool may be less detrimental initially thought due to the potential inefficiency of exchange rate changes (Obstfeld 2002). The resurgence of exchange rate pessimism stems from the fact that in very open economies, devaluation does not work because prices and wages immediately increase to wipe out any competitive advantage (Pomfret 2005). In addition, the emergence of the asset model of exchange rate determination (the portfolio-balance channel) (Branson 1990) and the Ricardian equivalence and perfect foresight by agent's concept (De Grauwe 1989) have stressed that the nominal exchange does not adjust immediately to correct external disequilibria as implied by the old OCA theory. For instance, developing countries - especially WAMZ countries - that devalued their currencies as a recovery effort under the structural adjustment package have faced mixed outcomes. In some cases, their trade balance and output improved, while deteriorated or remained unchanged in others (Pomfret 2005).

The other opposing view is that some episodes of nominal exchange rate adjustment have been effective in restoring equilibrium after a shock. For instance, the 1982 devaluation in Belgium helped restore the domestic and trade account equilibrium at a lower cost (De Grauwe 2000); the Italian devaluation contributed to sustaining economic activity after the exit from the ERM in 1992 (Mongelli 2002). However, Mongelli (2002) argues that these examples should be recognised as one-off interventions and that the exchange rate instrument cannot be used systematically.

2.4.5 The endogeneity of OCA

One significant contribution towards the new OCA literature emanated from Frankel and Rose (1998) endogeneity arguments. As recalled, the early OCA literature sought to identify the criteria that countries must satisfy before joining a monetary union (i.e. ex-ante). Instead, the endogeneity literature, pioneered by Frankel and Rose (1998) and Frankel and Rose (2002) has focused on changes in economic structure and performance that may result from participation in a monetary union, i.e. ex-post. Frankel and Rose (1998) argued that a common currency would act as a powerful driver of convergence: the possibility of countries turning endogenously into an OCA ex-post instead of ex-ante.

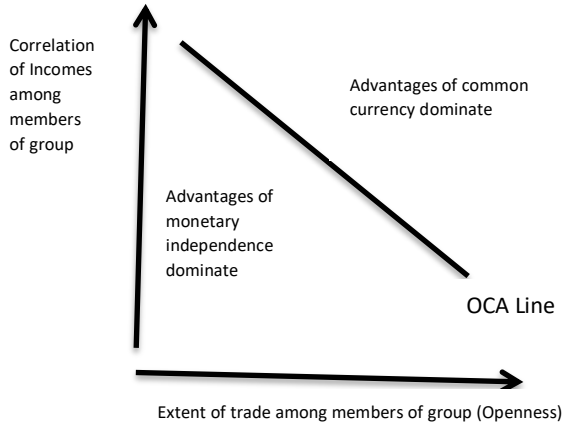
The authors' argument is grounded in the following two hypotheses: First, the introduction of a single currency eliminates the exchange rate risk (and, therefore, the cost of hedging), lowers information costs, and raises price transparency, reducing market segmentation and encouraging competition. By the removal of borders (broadly defined to include separate monies), monetary unification will lead to an intensification of bilateral trade (Tavlas 2009). Secondly, there is a positive linkage between trade integration and income correlation (Frankel and Rose 1998). Precisely, trade integration will propel industrial specialisation between countries in the goods in which they have a comparative advantage. More significant intra-industry trade will contribute to common demand shocks, as well as a greater correlation of policy shocks through more similar policies. This, in turn, will lead to greater business cycle harmonisation from industry-specific shocks, lessening the need of country-specific monetary policies and reducing the cost of giving up a nationally tailored monetary policy (Tavlas 2009; Pisani-Ferry 2013; Gong and Kim 2018).[19] Hence, the endogenous OCA literature leads to the conclusion that

[19] For instance, increased trade among industrialized countries, like European countries, is typically intra-industry trade based on economies of scale and imperfect competition. Therefore, it does not lead to a higher specialization of the countries (as argued by Krugman) which could cause the higher possibility of asymmetric shocks (Horvath 2003). Instead, increased international trade patterns and business cycle correlations become endogenous. This represent a simple application of the famous Lucas critique (Broz 2005). According to the Lucas Critique, a prediction based on historical data would be invalid if some policy change alters the relationship between relevant variables. If the policy change alters the relationship between the variables, then past relationship between the variables would differ in the future relationship.

participation in a monetary union itself reduces asymmetric shocks among participants.

In Figure 2.3, the downward sloping OCA line shows that the net benefits of joining a monetary union depend positively on the extent of trade and income correlation between countries. Countries above the OCA line with high trade linkage and high-income correlation would find it beneficial forming a currency union (Mongelli 2002). Furthermore, because the endogeneity of OCA properties evolves, even if prospective candidates for currency union are under the OCA line, once they join further trade integration will increase the income correlation and countries will move upwards, crossing the OCA line in Figure 2.3 (Frankel 1999).

Figure 2.3 Openness, Income correlation and OCA line



Source: Frankel and Rose (1997), Frankel (1999) and De Grauwe and Mongelli (2004)

Therefore, a country's suitability for monetary union does not depend on the prior satisfaction of the OCA criteria, but once a country enters a common currency area further economic integration will turn this country endogenously into an OCA ex-post (Frankel and Rose 1998). This buttress the argument that the real and or nominal convergence criteria set for entry into a currency union (i.e., EMU) was not necessary because convergence could occur endogenously once a currency area was put in place (Wagner 2014).[20]

In the same line, we can argue that even if WAMZ is formed with non-optimal members, continued economic interaction could shift towards an OCA, and the

[20] (see, Emerson et al. 1992; Frankel and Rose 1997; Mongelli, 2002, 2008)

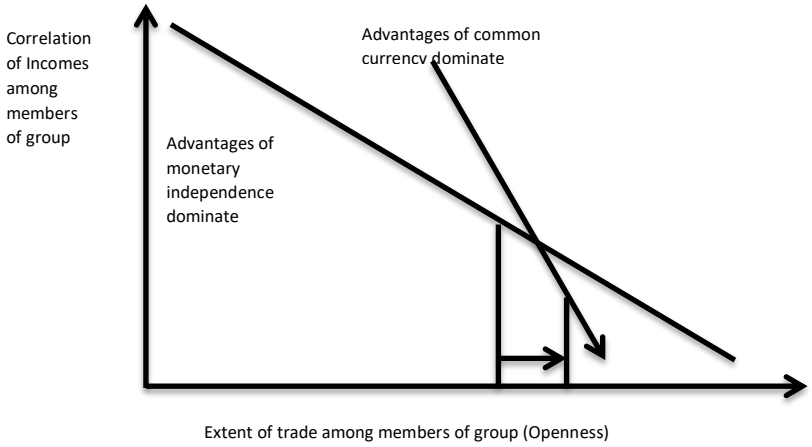
single monetary policy is more likely to be union-wide appropriate over time. However, the main obstacles to forming the WAMZ are the differences in external shocks (Beetsma and Giuliodori 2010). The terms of trade shock tend to be relatively large and are typically not very highly correlated across the countries.

Moreover, internal trade among prospective union members is relatively small. This contrasts with Europe, where the high level of intra-regional trade and international trade links enforced the synchronisation of business cycles (Frankel and Rose 1998; Artis 2003) eventually leading Europe to become a common currency area ex-post (Mongelli 2002a; Fidrmuc 2004; Baxter and Kouparitsas 2005; Willett et al. 2010). On the other hand, the estimates of the trade gains show significant variations across studies (Rose 2000; Persson 2001; Frankel and Rose 2002), which provides the fundamental arguments of the endogeneity hypothesis. Hence, a critical question here is whether WAMZ is anchored on the expectation that trade integration and income correlation will increase once a currency union is created.

In contrast to the pro endogeneity OCA theory, Krugman (1993) argues that increased economic integration increases the probability of asymmetric shocks. While the monetary union may intensify trade, it might also facilitate localised specialisation. In other words, due to the economies of scale, higher integration would lead to a regional concentration of industrial activity (Horvath 2003) and the less diversified output could increase the divergence of asymmetric shocks (See also, Eichengreen 1990; Bayoumi et al. 1994). This, in turn, makes the business cycle more heterogeneous. Accordingly, the costs of the loss of direct control over national monetary policy would rise faster than the net benefits (increase intensification of trade) ex-post (Mongelli 2002). Krugman (1993) uses data from North America to show that increase in trade integration, facilitate further divergence instead of increasing income correlation and economic convergence. Therefore, increased integration does not guarantee economic convergence; instead, it increased the cost of monetary union. An increase in integration would move a country away from the OCA line in Figure 2.4; more openness and less correlation. Some Economists critique Krugman's hypothesis for suggesting that a common currency would be most desirable for

two countries that otherwise have nothing to do with each other (Basten 2006). Besides, Krugman argues the cause why the price of monetary union may go up faster than the benefits to the possibility that it would take longer for a region to endogenously become an Optimum Currency Area.

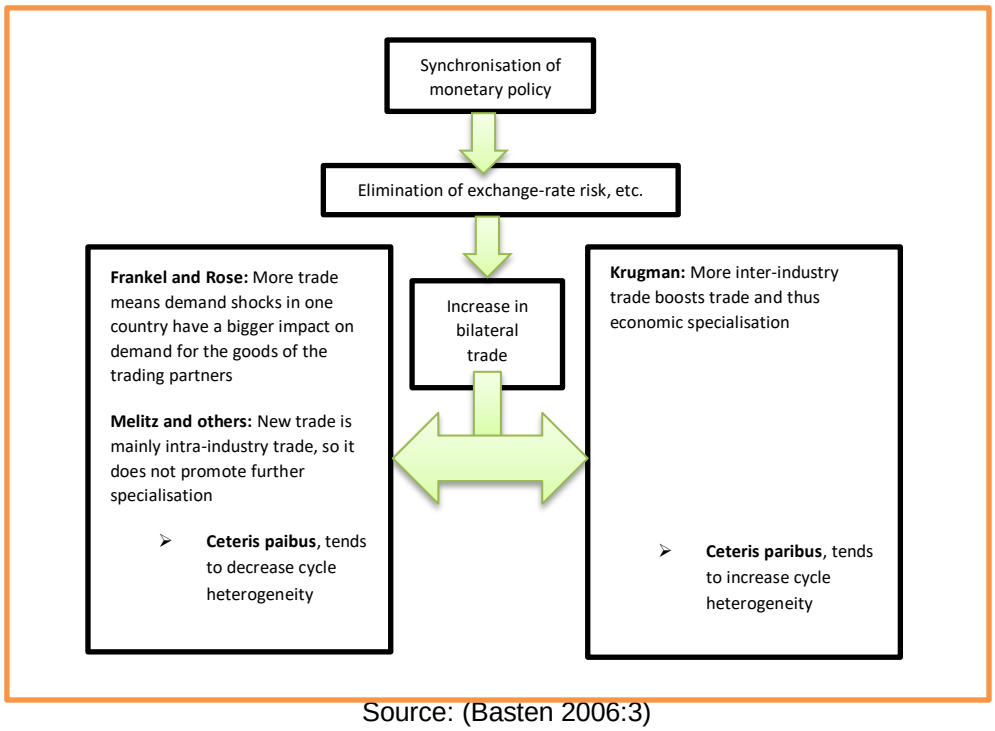
Figure 2.4 Krugman's specialisation effect



Source: Frankel and Rose (1997), Frankel (1999) and De Grauwe and Mongelli (2004).

Finally, a summary of the endogeneity argument is presented in Figure 2.5.

Figure 2.5 Endogeneity of the OCA (Frankel and Rose vrs Krugman)



Source: (Basten 2006:3)

2.5 Methodological approaches and debates

We reviewed in section 2.2.3 that the early OCA criteria lacked an operational measure to gauge optimality. When interest in European monetary integration resurfaced in the early 1990s, there were also theoretical advances in macroeconomic theory and econometric techniques with which to evaluate the issue of monetary integration (Tavlas 1994; Mongelli 2008). Thus, the various approaches aimed to operationalise the OCA and develop ex-ante criteria for assessing the potential consequences of monetary unification (Pisani-Ferry 2013). Various econometric tools were used to assess why specific groups of countries may form an OCA either at empirical data indicating convergence or at projections and anticipated trends.

These methodological approaches can be categorised into two: the first seeks to assess the degree of the cost involved in abandoning monetary policy autonomy, while the second project the benefits, specifically higher trade integration. It is worth mentioning that most of the empirical literature has been conducted in the context of European monetary integration in some sense (Mongelli 2005). This thesis argues such models underpinned by theories of monetary integration could be applied in the context of the proposed WAMZ currency union if certain assumptions and justifications are held.

2.5.1 The Costs

As mentioned earlier, the main cost of joining a currency union is the loss of autonomy in monetary and exchange rate policy of the individual member countries. The new OCA literature argues that the degree of the cost depends importantly on the nature of the shocks to which the participating countries in a currency area are subjected (Tavlas 1994). As a result, modern works operationalising the OCA considers the analysis of shocks affecting economies a crucial area of inquiry since those shocks almost capture the interaction between several properties of the early OCA (Masson and Taylor 1993; Alesina and Barro 2002). The intuition (based on Mundell 1961 and Kenen 1969) is that in the event of disturbance, if the speed with which the partner countries

adjusts[21] are similar, then the need for policy autonomy is reduced and the cost of losing direct control over the nominal exchange rate falls (Mongelli 2008). Correspondingly, several methodological approaches have appeared to examine empirically the issue of shocks focusing on the nature of shocks or shock asymmetry. Three broad types of empirical approaches have been applied: Asymmetry of shocks; Cluster analysis and Generalised Purchasing Power Parity (G-PPP).

i. Asymmetric shocks

Bayoumi and Eichengreen (1993) pioneered the literature using a Structural Vector Autoregression (SVAR) model for the analysis of monetary union. Building on the VAR model proposed by Blanchard and Quah (1989), the authors utilised SVAR to identify supply and demand shocks. The patterns of correlation of these shocks across members of the European Community (EC) were compared with the ones prevailing in the United States (Artis 2003). The underlying rationale of their study is that countries experiencing similar disturbances are likely to respond with similar policies, thus making them better candidates for a monetary union. They reported less correlated shocks (mainly because of the low degree of labour mobility) for European countries relative to the States in the US and concluded that forming a union in Europe might be pricey. Other works, including Bayoumi and Eichengreen (1994), Bayoumi and Eichengreen (1997) and Barro and Tenreyro (2007) have also utilised different methods to evaluate the nature of shocks in EMU. Arguably, the VAR empirical studies focus mostly on Europe. There is scarcity of such published work in WAMZ (Fielding 2002; Fielding and Shields 2005; Houssa 2008). Given the criticisms to VAR models, Houssa (2008) used dynamic structural factor models to estimate aggregate demand and supply shocks for West African countries. The paper reports negative and low positive correlations of supply shocks and concludes against forming a monetary union of the West African countries because the countries will find it difficult to adjust to supply shocks in a

[21] Taking into consideration also the policy responses

monetary union. However, demand shocks are more similar among the French-speaking countries of the region.

ii. Cluster analysis

This methodology delineates the OCA properties based on clustering countries that share a significant set of integration characteristics or homogeneities, reflecting their suitability for monetary union (Kamara 1986; Tsangarides and Qureshi 2008). Cluster analysis appears to be a relatively appealing methodology and has been applied to a wide variety of research problems, assessing potential currency union member countries (Artis and Zhang 1997; Artis and Zhang 1998; Artis and Zhang 1999; Artis 2003). Clusters are formed based on countries' similarity in respect of vectors of characteristics (the OCA criteria) such as business cycle synchronisation, bilateral trade intensity, symmetry of shocks, synchronisation of a country's monetary policy, inflation convergence, among others. The OCA characteristics are often centred on an anchor country, taken as a benchmark. For instance, Artis and Zhang (2002) formed clusters of potential EMU members using six OCA criteria, which were centred on Germany, the benchmark country.

Though the cluster analysis is an appealing methodology and allows for modifications, the initial problem is the attempt to systematically define the relevant integration variables among the many OCA properties, measure them and then identify an optimum grouping strategy (Kamara 1986). Also, the reliance on detailed economic data makes it unsuitable for developing countries like WAMZ where data is scarce. Finally, identifying an anchor country will be difficult among WAMZ countries. Qureshi and Tsangarides (2008) assess the prospects of forming the proposed monetary unions in WAMZ and ECOWAS using cluster analysis. Countries were clustered into groups sharing high similarities based on OCA criteria; output volatility, real exchange variability, regional trade intensity, terms of trade synchronisation, inflation, government balance, and debt-servicing requirement. They report considerable dissimilarities on the economic characteristics of the West African countries. They find countries in WAEMU tend to cluster together. The paper suggested

against the formation of ECOWAS single currency against the backdrop of that stage.

iii. Generalised-Purchasing Power Parity Analysis/Real Exchange Rate

Another methodology that emanated in the monetary integration literature is the Generalised Purchasing Power Parity (G-PPP) by Enders and Hum (1994). This approach based on cointegration analysis examines the extent to which group of countries exhibits convergence of their real exchange rate. The theory of G-PPP states that real exchange rates tend to be nonstationary because they are influenced by some nonstationary macroeconomic variables such as real output, terms of trade, government consumption and interest rates. Hence, if the fundamental variables are sufficiently interrelated, as in a currency union, real exchange rates may share a common stochastic trend. For two economies to qualify for creation of a currency union, they must experience symmetrical shocks to their macroeconomic variables. The number of common stochastic trends is an indicator of the pattern of external shocks affecting the countries and whether monetary policy coordination will be successful in reducing their effects (Mouratidis 2001). In summary, the G-PPP postulates that, where higher cointegration of real exchange rates exists among participating countries, monetary union would incur lower costs.

On the other hand, the G-PPP method has been argued to represent just one facet of the OCA criteria, making an inadequate approach. Also, policy interventions can alter real exchange rates (through the nominal rate) without affecting the underlying economic causes, thereby undermining the basic cointegration analysis assumption that real exchange rates capture the economic fundamentals.

2.5.2 Benefits

i. Increased Trade and the Gravity Model

Trade is not the only factor to consider when forming a monetary union. However, each potential union must be evaluated to the full spectrum of its benefits and costs. Frankel and Rose (1998) argue that a common currency promotes closer trade links and more synchronised cycles. Hence, the last strand of literature relies on using econometric analysis to calculate the trade benefits of a common currency (Mongelli 2008).

The modification of the standard gravity model of trade contributed as the main methodological motivation. The standard gravity model includes variables for national incomes and distances as determinants of bilateral trade. Rose (2000) modified the standard gravity model with other variables, including a dummy variable for the presence of a common currency in the estimation. Using a gravity model on a panel covering 186 countries during 1970-1990, Rose reported that a common currency shared between two countries increase bilateral trade by three times as much as do otherwise similar countries with different currencies. Though this paper motivated several studies into the currency union trade generating effect, the rather large impact of currency union on trade raised a great deal of scepticism (Persson 2001). Consequently, other evidence drawn from the EMU (Micco et al. 2003) has suggested a moderate impact of a single currency on trade between members, much less than initially reported by Rose.

Against this backdrop, the thesis assesses the potential effect of a single currency on intra-regional trade of WAMZ (ECOWAS) in chapter 5. It is worth mentioning that the proposed currency union is considered as an essential policy strategy aimed to increase intra-regional trade - which is currently considered to be rather low (see Chapter 3).

2.6 Chapter summary

The classic OCA analysis sought to evaluate the circumstances under which macroeconomic policies could most effectively restore or attain the goals of low unemployment, low inflation, and balance-of-payments equilibrium in the face of shocks to an economy. The underlying framework attached considerable weight to the ability of the authorities to fine-tune an economy in the short run.

However, the OCA witnessed several ups and downs during the 1970s and 1980s reflected, in part the following paradoxes among the contributions made by Mundell, McKinnon, and Kenen. Besides, the weaknesses and limitations of the analytical framework behind the OCA theory then started to emerge. Subsequent developments, in both the international monetary system and academic thinking, weakened the case for using macroeconomic policies to fine-tune an economy. Participating in a currency union is now deemed to generate fewer costs in terms of the loss of autonomy of domestic monetary policy instruments and creating more emphasis on the benefits of currency areas. Also, the literature on the endogeneity of the OCA reinforced the trade benefits of monetary unions.

Furthermore, some significant advancement in Econometrics made it possible to ’operationalise’ several OCA properties, providing a consistent framework in which a country’s characteristic can be used to determine its optimal exchange-rate regime.

Having discussed the theoretical underpinnings of OCA theory and its various criteria, we turn to the empirical investigation of whether WAMZ constitutes such an OCA. This is an issue that a large part of the growing literature on WAMZ has focused on. Before we get into estimating the level of convergence among WAMZ countries and the potential trade benefits of monetary union, the thesis first reviews the historical development of monetary integration in West Africa (in the next chapter) to understand better the current developments in the region.

Chapter 3 Monetary integration in West Africa: A historical reflection

3.1 Introduction

Monetary integration has several components, including sharing a common currency and a central bank or allowing the convertibility of currencies for a group of countries. It could also involve a group of countries fixing their exchange rates to each other, though the rates may vary for each member with non-members (Corden 1972). One support for monetary integration lies in the proposition that it has the potential to stimulate community trade because it removes exchange rate costs and provides certainty in the trading (Rose 2000; Alesina and Barro 2002; Frankel and Rose 2002). Moreover, countries aspiring to form a deep integration scheme could advance to economic and political union status. This could have a broader implication for sustainable peace and prosperity and the tackling of common issues such as climate change (Laird 2002).

Therefore, countries aspiring for economic and political union status must consider what kind of monetary integration process is desirable. The increased number of regional economic communities around the world suggests that discussions about whether countries should pursue a shallow or deep integration scheme will continue. The Economic Community of West African States (ECOWAS) was formed in 1975 to achieve an economic and political union status as stipulated in article 2 of their 1975 treaty (Aryeetey 2001). A revised 1993 ECOWAS treaty demonstrated the need to establish regional institutions that would accelerate the deep integration goal.

Thus, two monetary integration zones emerged from the revised 1993 treaty. The first is the West African Economic and Monetary Union (WAEMU) established in 1994 by the 8 French Speaking countries in West Africa. It must be noted that these eight countries shared a single currency (the CFA Franc) inherited from the colonial era. Guinea Bissau which was a Portuguese colony in West Africa joined WAEMU in 1997. The second monetary zone was established in 2000 by the 5 English speaking countries and Guinea Conakry

(French Speaking) as the 6th member; called the West African Monetary Zone (WAMZ). It is hoped that once the convergence process is met, the two monetary zones will merge to establish a single currency (*eco*) and a central bank that would effectively transform ECOWAS into an economic union. ECOWAS is currently working on launching the *eco* in 2020.

However, monetary integration is not a new phenomenon in West Africa, although current research has paid insufficient attention to this. Indeed, research has demonstrated the presence of common currencies such as the cowries and gold in pre-colonial West Africa (Hopkins 1970; Johnson 1970; Guyer 1995; Hopkins 2014). The colonial-era also encompassed common currencies and central banks such as the West African shilling of the British colonies and the CFA franc of the French colonies. The West African Currency Board acted as a central bank for the British West African colony while the French used their central bank in Paris as the central bank of the colonies. Given the mounting historical evidence of the existence of common currency in the sub-region, a natural question arises; why did the common currencies not promote intra-West African trade? The chapter develops an argument that the use of trade as the primary motivation of a single currency in the ECOWAS seems untenable given the low levels of intra-WAEMU trade.

Nonetheless, the current attempt for monetary integration could be accelerated if ECOWAS members reflect on their past institutional arrangements and adjust to modern economic realities. How the evolution of these arrangements can be explained, and the nature of the current system understood, remain matters of considerable controversy (Akyeampong 2006). Albeit, the study of the history of African economies, at least for the pre-colonial period to the post-colonial regimes of the contemporary era, has been marked by several concepts being offered either by neoclassical economic historians (North and Thomas 1973; North 1994; Akyeampong 2006; Harreld 2016) or those applying Marxian economic thought (Harreld 2016).

Pierson (1996) argues that institutional change is a path-dependent process. Thus, when institutional and policy changes are in place, social actors adapt to those changes, frequently making substantial investments in the process.

Consequently, the notion of path dependence has been applied to various social sciences research because of the increasing interest in institutions and economic growth (Magnusson and Ottosson 2009). The path dependency theory supports the proposition that an appreciation of historical changes is one crucial aspect of understanding current institutional development in a country or region (North 1990; Acemoglu et al. 2001; North 2006; Nunn 2007; Acemoglu and Robinson 2013). Accordingly, the historical past related to monetary integration in West Africa could be divided into three periods, namely; the pre-colonial era, the colonial era and the post-independence and subsequent formation of ECOWAS. A holistic assessment of the process of monetary integration and its relationship to intra-community trade from a historical point of view has not been sufficiently done in West Africa. If history matters, then our analyses must explore the particularities; i.e., events, structures and circumstances of the past (Hodgson 2002).

Therefore, this chapter aims to contribute to the existing literature by assessing monetary integration in West Africa from the pre-colonial era to the present day. This study would deepen our understanding of the process of monetary integration in West Africa today and the extent to which lessons could be drawn from history. The structure of the chapter is as follows. Section 3.2 will discuss the process of monetary integration in West Africa in the pre-colonial era. Section 3.3 will discuss monetary integration during the colonial era, while section 3.4 will discuss the current attempts to launch a common currency and central bank in the ECOWAS region. Section 3.5 summarises and concludes the chapter.

3.2 Pre-colonial era

This section seeks to evaluate the monetary systems in pre-colonial West Africa and assess the extent of monetary cooperation within the area. Written accounts of West African history by people living outside the region received prominence with Muslim traders in the trans-Saharan trade. The trans-Saharan trade witnessed the growth of Empires in West Africa, especially in the middle belt of the region. Whether the Saharan trade could be directly associated with

the growth of empires in the region has not been sufficiently researched (Guyer 1995). The most commonly known empires of Western Sudan (Ghana, Mali, and Songhai) were called trading empires because they emerged, expanded and evolved as regional and international trade hubs (Guyer 1995). The ease at which goods and services were exchanged played a role in the expansion of trade in the region. Trade by barter and the use of commodities facilitated the exchange of goods (Bah et al. 2017).

So, discussion about monetary integration in West Africa in the pre-colonial era demonstrates the extent to which there exists a real subsistence economy, a barter system and an organised system of exchange where monies or commodities were used in the exchange of goods. These three scenarios will be the basis to understand monetary integration in West Africa in the pre-colonial era.

3.2.1 Barter system

A subsistence economy exists when people consume what they produce without any trade (Bohannan 1959; Ekundare 1973; Webb Jr 1982). However, Webb Jr (1982) argued that a real subsistence economy has no analytical usefulness because it is not found in the historical or ethnographical records. Human beings and their ancestors probably have always lived in groups and exchanged goods and services in various forms. Thus, the historical narratives where a subsistence economy is treated as the first phase in the development of trade and money was little more than to set off the succeeding stages. Therefore, the concept of a barter economy probably represents the nature of exchange in many ancient societies, including in West Africa than a pure subsistence economy. For this, discussion about the monetary event should start with a barter system because it demonstrates exchanges between groups of people.

The idea of barter is complicated because of the difficulty to establish what constitutes a barter and whether the goods exchanged could be treated as money (Webb Jr 1982). Therefore, we should define money and establish its

properties to locate barter within it. Modern-day money is treated as a medium of exchange, a store of value and a unit of account (Sloman et al. 2006; Asmundson and Oner 2012). It is also treated as notes and coins and fiat in modern economies, and this will be discussed in more detail in the later sections. Barter occurs when goods are exchanged for other goods where the price is expressed either implicitly or explicitly (Webb Jr 1982; Asmundson and Oner 2012), provided there is no coercion to do so and that participating agents treat the goods having equal use-value and it is to their mutual benefit (Webb Jr 1982). In this case, goods used in a barter economy could be treated as a medium of exchange that partially qualifies it as money. However, the extent to which a barter system demonstrates a unit of account and a store of value has not been established in the existing literature. Asmundson and Oner (2012) are of the view that if the goods are not easily transferable to a third agent because the agents may not fancy the good or their preference may not be available at the time, then we cannot treat such goods as money. However, if non-perishable goods are exchanged repetitively, then they can assume the properties of money in the context of the store of value (Webb Jr 1982). It still leaves the unit of account as a basis for money unaddressed in a barter system where goods are priced in common denomination.

Nonetheless, several papers have examined trade and the barter system in West Africa that could improve our understanding of monetary integration in the region. Hopkins (2014) highlighted that many trading centres in West Africa used the barter as a means of a business transaction. Ekundare (1973) recalled that the people of West Africa adopted the barter system of exchange long ago, before the advent of foreign traders. It suited the partially subsistence economy[22] of the region. The early exchanges were the results of surplus production over and above the subsistence need. The amount of produce a family could offer and the goods it required in exchange were often small in quantity and value (Ekundare 1973). This process was only likely to occur within small clusters of people or villages.

[22] Partially subsistence economy refers to a limited number of goods being exchanged while the rest are directly consumed by the producers.

The pure barter economy was convenient for a small amount of trade between groups of people within the region. Barter was also convenient for trade between West Africa and especially with the Arabs and later the Europeans because each party required specific goods that were readily available from one another. For example, the Arabs brought salt, so needed in West Africa in exchange for gold (Waines 2012). Within West Africa, goods such as textiles, kola nuts, ivory, copper, and food as well as live animals were traded in a barter system because there was a demand for them (Bah et al. 2017). However, as trade expanded within the region and between the region and the rest of the world, the viability of a barter system to serve as a unit of account required large quantities of these goods to be exchanged. The fundamental difficulty for a barter economy was the extent to which the goods are transferable to a third party, especially when it involves perishable goods such as food.

Our understanding of monetary integration in West Africa could be enhanced if we examine trade between the empires and kingdoms at the time as well as goods used as the medium of exchange. The trading quantities are unknown, although, Bah et al. (2017) summarised several papers which demonstrated that intra-West Africa trade and trade with the outside world at the time were extensive. These activities inevitably required a medium of exchange that was generally going to be acceptable.

Ekundare (1973) made a distinction between a barter system and commodity trading, which extend to goods being treated as money in a barter system and commodity currencies. That is, any commodity adopted as a currency was known to be generally accepted as a medium of exchange in the empires and for trade with foreigners that were employed extensively for exchange rather than for consumption. In this, Ekundare (1973) treated a barter system as a pure exchange of goods that are meant for consumption rather than for a third-party exchange. This is plausible because a barter system would not require an extensive trade that was gradually taking a foothold into intra-West African trade and trade with the rest of the world. Therefore, a shift occurred from the pure use of a barter system with a commodity as a medium of exchange.

The review in this section demonstrated that trade expanded in West Africa and with the rest of the world, the commodity was used as a medium of exchange although some papers treated this exchange as barter.

3.2.2 Commodity trading and currencies in West Africa

Despite the barter economy existed in West Africa, some of the goods used for exchange could not be treated as money because they did not serve as a unit of account. These goods included cloth, gold, salt, and iron. Nonetheless, the barter did serve as a medium of exchange and a store of value, though the exchanges were not extensive. Therefore, the expansion of trade necessitated the need to have a unit of account in addition to the other properties of money to smooth transactions (McPhee 1971; Hopkins 2014).

The empires of Western Sudan epitomised the extent of monetary integration in West Africa. These empires span from the 7th century to the 18th century (Bah et al. 2017). They comprised of a King that oversaw lesser kings. For example, during the Mali Empire, Mansa Musa's reign saw 24 lesser kings under his direct authority. As a result, the extent to which commodities were treated as common currencies in precolonial West Africa was made easy with the political structure of the empires that acted as a single administration or a federation. Moreover, the influence of Muslim traders through the trans-Saharan trade routes meant that the empires needed a common medium of exchange in order to facilitate domestic and international trade. In other words, there was some element of cooperation to accept some commodities as a medium of exchange because of the extensive trade.

Hence, several commodities were used in West Africa as a medium of exchange and were treated as common currencies because they were generally acceptable and were convertible to each other (Johnson 1970; Conrad 2010; Hopkins 2014). These commodities included cowries, salt, gold, cloth, grains, iron rod, manilas, and copper (Adomakoh 1962b; Johnson 1970; McPhee 1971; Lovejoy 1974; Odunbaku 2012; Hopkins 2014). In order to maintain the convertibility of these commodity currencies, their values were fixed against other currencies outside West Africa especially the dinar or they were used as benchmarks (Johnson 1970; Hopkins (2014). This was facilitated

by the cooperation of these empires with North African regions, especially present-day Morocco and Libya because they had representatives that monitor's trade agreements.

Within the region, these commodities also acted as common currencies. For example, Webb Jnr (1982) argues that grains, cloth, salt, and livestock were traded in Senegambia and other regions of West Africa and were also a staple food. Webb Jnr (1982) highlighted that cloth could be treated as monetised currency in Senegambia because it was used in the exchange of other goods such as salt and grains. Moreover, 'cloth' also qualifies as a property of money because it was used as a medium of exchange, a store of value and unit of account in the region. Furthermore, it was used to purchase other commodities and was transferable. The prices of grains and livestock and the extent to which they fluctuate were determined by the season harvests rather than the quantity of cloth that acted as a common currency. This is entirely consistent with the Keynesian economic perspectives about how demand determines prices rather than money supply. Although this has not been explicit in the existing literature, it was likely that even where the cloth was not sufficiently available as a medium of exchange; there would have been a tendency to use the grains and livestock to trade in a barter system.

Similar accounts have been noted in other parts about West Africa, where other commodities were used as common currencies (Johnson 1970; Lovejoy 1974; Guyer 1995). For example, Guyer (1995) argues that small commodity production, exchange, and monetisation were firmly established in precolonial Africa. For instance, the Asante empire monetarized pieces of iron or iron rods, '*nnabuo*' as their common currency and was in circulation and was generally acceptable. Their acceptability was due to their practical value as objects that could be beaten into the form of weapons or agricultural equipment. Guyer (1995) cited by Hopkins (1973:69), where the iron rods were split into small denominations to facilitate exchange. The other small kingdoms in West Africa such as the Hausa and Oyo empires preferred the use of cowries and traded with the savannah and the Guinea regions in the North and Western part of West Africa (Johnson 1970). While Oyo exported locally made woven cloth and

‘*kola nuts’* to the Savannah, they imported horses, salt, and dresses that corroborate the presence of cooperation between these trading kingdoms.

The review of the literature demonstrated that the system of commodity currencies in West Africa appears to be fragmented, given that many were in circulation. This fragmentation was due to the presence of partially autonomous lesser kingdoms within the empires of Western Sudan and the degree of their supply. These fragmentations imply that the control of money supply was fragmented. However, what can be established is that these commodity currencies were convertible because the lesser empires were directly under the authority of the larger empire or at least a high degree of cooperation ensured the convertibility of these currencies.

Moreover, the presence of these empires and the cooperation that existed meant that there was a gradual move toward the adoption of a single currency. The cowries began to act as money in greater parts of West Africa. This was made possible because the empires of Western Sudan gradually absorbed the smaller kingdoms into a single administration in West Africa. Indeed, Hopkins (2014) highlighted that without colonial rule, West Africa was gradually leaning toward an economic and political union. Nunn (2008) also demonstrated that without colonial rule, Africa would have been on a much-advanced stage in terms of the development of their institutional framework and general well-being. Acemoglu et al. (2001) also associated poverty and underdevelopment in former colonies to changes in the institutions resulting from European colonialism. These assertions demonstrated that West Africans recognised the value of integration as we understand it today to expand trade and to maintain peace. Bah et al. (2017) maintained that the small kingdoms agreed to be ruled by a King to harmonise trade and maintain peace because trading could not flourish without peace. This is plausible because most of the kingdoms derived their wealth through trade expansion.

Therefore, this process skewed monetary integration toward the use of cowries as a single currency and administration. The ’*cowries’* were gradually playing an important role in regional and international trade. Conrad (2010) highlighted that West Africans had preferred the cowrie as a medium of exchange as early as

the 13th century. This period also witnessed a significant shift in the growth of wealth and empires as trade expanded. Johnson (1970) also argued that cowrie and gold were the most common currencies in West Africa in the pre-colonial era. Hopkins (2014) noted that the other currencies mentioned earlier were only used where the cowries were less available. Odunbaku (2012) stated that the cowries were used as a medium of exchange in almost all, the West African kingdoms in the pre-colonial and the colonial era. These findings demonstrated that although other commodities were used as currencies, the cowries seem to be the most widely used.

Moreover, it was also directly convertible into all the other commodity currencies which qualify as money. Furthermore, Johnson (1970) and Hopkins (2014) demonstrated that the cowrie was fixed in value against currencies outside West Africa, such as the dinar. This ensures certainty in the trading system within the region and with the rest of the world. Therefore, the cowrie did act as a common currency in West Africa in the pre-colonial era and the colonial era. These cowries initially originated from North Africa and the Middle East and later the Maldives and East Africa (Lovejoy 1974). On the other hand, it is not clear how the Kings or their royal officers issued the cowries. Nonetheless, given that the Empires of Western Sudan acted as a single administration and the cowrie was used extensively and was fixed in value, it was likely that the royal office acted as a central bank.

In summary, we can argue that virtually pre-colonial West Africa had economies sufficiently developed to require the use of common currencies as mediums of exchange and units of account (Johnson 1970; Lovejoy 1974; Hopkins 2014). This suggests the existence of common currencies or a standard monetary system during the era. On the other hand, colonialism also marked a historical shift in our understanding of monetary integration in West Africa.

3.3 Colonial Era: Arrival of the Europeans and Colonialism

The arrival of European sea traders and subsequent colonialism marks a new epoch in defining the history of West Africa (Davidson and Buah 1978; Heldring

and Robinson 2012; Acemoglu and Robinson 2013; Hopkins 2014). The era marked a significant break with the past and signified the start of the modern economic history of West Africa. While there seemed to be an organised economic system during the pre-colonial era, this phase saw a shift from primitive institutional arrangements to the adoption of standardised currencies and a well organised monetary system (Nunn 2007; Nunn 2008).

The economic history of West Africa since the first days of European contact may be divided into two stages: First, the arrival of the Europeans on the coast of West Africa played a significant role in establishing the new commerce, dominated by the Atlantic slave trade, which flourished until its legal abolition in the early 19th century. Between 15th and 17th centuries, the Portuguese made the first remarkable exploration of the coasts of West Africa and were subsequently joined by other European merchants: English, French, Dutch, Danes, and traders from the north German ports. By the end of the 18th century, the English and French had established themselves in several positions on the coast of West Africa (Davidson and Buah 1978; Akyeampong 2006; Cham 2007; Hopkins 2014).[23]

The abolishment of the slave trade ushered in the second phase of European contact in West Africa, thus colonialism. This phase wrought an economic revolution in West Africa as colonial rules were set up between the late 19th century and early 20th century (McPhee 1971; Olaniyan 1971). By exploiting linguistic, ethnic and cultural differences, West Africa was partitioned into small units (states) arbitrarily between 1885 and 1906 as the rivalry between Britain and France intensified (Keltie 2014). The new West African States- except Liberia[24]- were colonised subsequently by France, Britain, Germany, and Portugal. France gained a large part of the region; Benin, Burkina Faso, Cote d'Ivoire, Guinea, Mali, Mauritania, Niger, and Senegal. While the West African British colonies consisted of Ghana, the Gambia, Nigeria and Sierra Leone. Germany traded with Togoland (Togo), Guinea Bissau and Cape Verde

[23] Initially, the principal aim of the European merchant mariners was in the commercial interest. For many centuries, gold that appeared in Europe, North Africa, and Asia were brought by the Moors and the Muslims across the caravan routes of the Sahara. Therefore, the Europeans determined to divert this trade into their own hands by trying to circumvent Muslim control of the Euro-Asia trade network. Nonetheless, gold was needed in Europe to pay for the spices they sought in south India and elsewhere in the East (McKenzie 1983).

[24] Liberia has been an independent state since the American-Liberians declared the country independent in 1847, i.e., where free slaves from America settled

(Portugal). Adomakoh (1962) and other scholars have argued that to this day the ethnic separation, although made absolute by the independence of the various countries, have had some negative influences on the political and development agenda of the West African countries.[25]

This section aims to explore the evolution of institutional development, especially the monetary systems in West Africa during the colonial era. We will try to identify whether these structures facilitated greater economic or monetary cooperation in the region.

3.3.1 Institutional Development

Institutions form the incentive structure of societies, and the political and economic institutions, in consequence, are the underlying determinants of economic performance (North 1990 and 1994). As argued in section 2, before European penetration, institutional changes were taking place already. African societies were at various stages of development, from communalism to a transitional stage below class-ridden feudalism (Walter 1972: 80). Trading by barter and the use of commodities as a medium of exchange in part facilitated the exchange of goods amongst the West African states and later with the Europeans traders.

However, the institutional developments in West Africa during the colonial era reflected the general economic and international commercial expansion in the 19th century (McPhee 1971; Helleiner 2003; Bah et al. 2017). The aim was to transform the indigenous institutional structures into ones that conformed more closely to international or colonial countries' standards. Eventually, external or intercontinental trade expanded (exports and imports). The colonial institutional developments contributed to two areas of debate. First, the traditional view in the existing literature is that colonialism directly interrupted the natural evolution of institutions in West Africa and part led to its current underdevelopment (Walter 1972; Acemoglu et al. 2001; Nunn 2007; Nunn 2008; Heldring and

[25] McPhee (1971), Olaniyan (1971), McKenzie (1983), Guyer (1995) and Hopkins (2014), have argued that the motive behind the first scramble for West Africa (Africa) was undoubtedly a product of many important developments in Europe at the time, i.e., economic (industrial revolution, etc.), scientific and religious.

Robinson 2012; Acemoglu and Robinson 2013). Acemoglu and Robinson (2013) described the European institutional arrangements as 'extractive', literally designed to extract resources. The underlying argument is that the institutional reforms oriented West African economies towards foreign economies instead of targeting domestic or regional economic growth since it was dominated by unequal exchange (Manning 1998). As a result, the process of economic cooperation among the West African States and the development of domestic and regional institutions retarded Olaniyan (1971).

Other papers have demonstrated that institutional reforms brought about by colonialism such as transportation networks, communication,[26] trade structures and modern money (common currencies) in part, promoted or could have been vital in promoting economic cooperation (Hopkins 1970; Bah et al. 2017). In this section, we explore the developments of monetary systems, specifically common currencies and highlight the driving forces behind the reforms during the colonial era. A sketch of these reforms will contribute to our understanding; whether the monetary systems could have enhanced economic integration in West Africa.

3.3.2 Development of Monetary Institutional Framework

The colonial-era introduced some reforms in the system of exchange, such as the use of monetised metal currencies and fiat money, which transformed the domestic monetary system of West Africa, (Hopkins 1970; Helleiner 2003). Long before the partition of West Africa, other currencies like the Spanish doubloons and dollars, the American doubloons and double eagle, the Maria Theresa dollar,[27] the French-franc piece, cowries and among others were in circulation as legal tender (Shannon 1950; Adomakoh 1962b; Ekundare 1973). These currencies can be classified into three groups based on their origin: Imperial coins, foreign coins and indigenous money (including barter). The latter has been treated extensively in section 3.2.1. The other currencies conditions were frequently as diverse as their origin and the standard media of exchanges

[26] Telegraphs, and postal systems were set up, linking colonial capitals to Europe, and linking military and administrative posts in the hinterland to the capitals
[27] An old Austrian coin

varied from one area to another. These foreign coins were exported to West Africa by the Europeans and, mostly circulated within the narrow confines of the coastal trading enclaves (Ofonagoro 1979).

Against the backdrop, the colonial authorities sought to replace the heterogeneous monetary systems within the region. The British enacted regulations to ensure that the English silver shilling was the only currency used in the West African colonies, and abolished foreign currencies in 1880. The French franc also became the currency of the French colonies in West Africa in 1826 and beyond, which later changed into the CFA francs. Furthermore, Adomakoh (1962) explains that the German marks were in circulation in Togoland before the First World War in 1912.

Generally, two main factors contributed to this reform: foremost, Kirk-Greene (1960) and Johnson (1970) explain that the indigenous money was cumbersome to transport within the country or across the region in any quantity. However, Ofonagoro (1979) contends that the shillings introduced by the British were also bulky when dealing with them in millions, indicating that the inherent transportation issues cannot be the motive behind it. Therefore, a more plausible explanation can be found in the main thrust of the colonial government's economic policies in the colonies (Ofonagoro 1979; Helleiner 2003). Second, considering the expansion of commerce at the time, the colonial countries ensured that the currencies of the colonies were soundly based, readily convertible, and otherwise compatible with the gold standard so that international trade could be conducted with smooth efficiency (Hopkins 1970; Helleiner 2003). Hence, a common currency was appropriate to reduce currency-related transaction costs associated with economic transactions between the Europeans and the colonies.

Subsequently, during the last decade of the 19th century, the main currencies in circulation in West Africa were the British silver coins in the British West African colonies, and the French franc pieces in the French West Africa colonies (Adomakoh 1962; Hopkins 1970). These currencies were later operated in the form of currency boards. Hence, this section intends to provide a sketch of the development of the two central monetary systems; the sterling and Franc

monetary standards and assess whether they fostered West African economic integration. This will contribute to our understanding of the current monetary systems among West African countries.

i. The Sterling Standard and West African Currency Board (WACB)

The commencement of the British Administration in West Africa inevitably meant that every aspect of its existence was to be controlled by British Imperial legislation (Akinrinsola 2003). Moreover, the monetary system was no exception to this. The monetary development or reforms were consistent in the four British colonies; the Gambia, Gold Coast (Ghana), Nigeria and Sierra (Pennington 1848; Shannon 1950; McPhee 1971). In 1825, the Imperial Government attempted to assimilate the currency of the colonies. The British shilling went into general circulation as a standard coin of the Empire[28] and thereby establishing an official sterling exchange system. The shilling was legal to be given concurrent circulation with the other coins already in circulation.

Subsequently, the new West African common currency received considerable resistance in the colonies. In most parts of the interior, where people were not used to foreign coins, the British coins were regarded with mistrust, as the natives continued with their conventional mode of exchange (i.e., cowries, barter, and so on)[29] (Ekundare 1973). Several measures - including several demonetisation ordinances - were taken to popularise the new coin currency and oust the old commodity currencies, which were hampering international trade (Chalmers 1972; Webb Jr 1982; Akinrinsola 2003). The Demonetisation Ordinance No. 2 of 1880 was passed to abolish the use of foreign silver coins in the colonies.[30] This was against the backdrop of a considerable number of Spanish dollars, Dutch silver and the 5-franc piece of silver circulating within the area. The falling gold-price of silver in the 1870's nearly removed the British

[28] After the act of 1816 had established gold as the only standard of value in the United Kingdom, the metallic money in the UK had been made a sound, and silver coinage had been successfully established as token money (Adomako 1962).

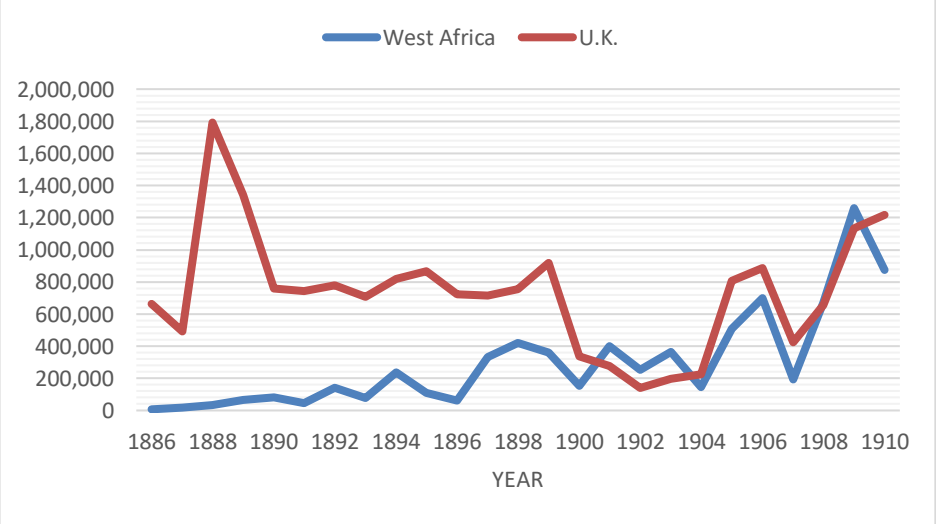
[29] These traditional systems of exchange remained among the West African states before the WACB was set up in 1912 (McPhee 1971; Akinrinsola 2003).

[30] Except for the Gambia, in 1893 it was estimated that about 80% of the coins in circulation in the Gambia was French five-franc pieces; the remainder was British silver coins. The preponderance of French franc in the Gambia is explained by the peculiar configuration of the country (Adomako 1962)

silver coin from circulation.[31] Also, Ordinance No. 9 of 1889 was passed by the colonial Government to demonetise gold dust and nuggets. Ekundare (1973) explains that the colonial government declared fixed prices in sterling for manilas and Maria Theresa dollars in 1902 and prohibited their importation afterwards in Nigeria.

Hopkins (1970) described that by the end of the century and onwards, the most important British colonies in West Africa, Nigeria and the Gold Coast, had begun to absorb the sterling silver (mainly shillings, florins) on a large scale, particularly along the coastal areas, where the people had long been accustomed to European ways. The British silver coin also gained popularity in Sierra Leone, and even more so in the Gambia, where the French francs were in wide circulation. Subsequently, wider circulation and demand for the British silver coins led to a tremendous increase in the export of silver coins into West Africa by the British Treasury boosting seigniorage profit (Olaniyan 1971). The figures for coin imports into West Africa from 1886 to 1911 are shown in Figure 3.1.[32]

Figure 3.1 A comparison of British Sterling Silver issued for circulation in West Africa colonies and the U.K



Source: Adomakoh (1962): Report of Departmental Committee on Special Currency for West Africa.

[31] The Spanish dollar appears to have been by far the most popular and to have had the most extensive circulation.
[32] Note that paper money did not exist in any of the colonies currently.

Figure 3.1 indicates that at some point (1902-1904; 1909-1910), the silver coins exported to West Africa were more or nearly equivalent to what was in circulation in the United Kingdom. The high demand resulted from the expanding turnover of sterling on the west coast as exports were converted into imports. Thus, most of the export earnings were exchanged for imported consumer goods such as textiles and hardware (Hopkins 1970). On the other hand, the domestic economy also absorbed the sterling through the payment of official salaries and public works (McPhee 1971).

With the spread of sterling and the expanding trade, came the introduction of British banks or financial institutions. It was difficult for commercial banking to develop or have existed in West Africa before the colonial era, for a reliable currency is vital to modern banking. That being so, banks became a necessity once the coin currency was in circulation. The banks enhanced the circulation of the British silver coins indirectly through shipping; importing coin from the Mint, which, owing to the peculiar geographical features of the region almost inevitably forced into a monopoly (McPhee 1971; Olaniyan 1971).

In 1891 the African Banking Corporation (ABC) established a branch in Lagos but ended its operation in the following year. The Bank of British West Africa (BBWA) was registered in 1894 in Lagos and took over the function of the ABC. The bank started with four branches in Lagos, Accra, Freetown, and Bathurst (Banjul). In 1961 it had about 104 branches in West Africa: 41 in Ghana, 53 in Nigeria, 9 in Sierra Leone, and 1 in the Gambia. Moreover, the Bank of Nigeria established in 1909 was later absorbed in 1912 by the BBWA, making it the only bank operating in the British West Africa colonies until the Colonial Bank, which served in the West Indies started to commence business in West Africa in 1917. Barclays Bank Ltd subsequently acquired the Colonial Bank in 1926, and before most West Africa countries attained independence, it had established about 200 branches (Adomakoh 1962).

Up till 1953, the BBWA and Barclays Bank Ltd enjoyed monopolies as the only two banks operating in the British West African colonies. However, since then, there have been crucial local banking developments in the region, importantly the creation of central banks after the colonies attained independence. It is also

worth noting that banks of different metropolitan countries were confined to their territories. Hence, until recently, the banking institutions existing in West Africa have predominantly been European (Adomakoh 1962).

The continued supply of the sterling coins and the banking system gradually raised some concerns within the colonies and among the colonial authorities. To begin with, the monopoly BBWA had in supplying the coins became a matter of controversy among the merchants, trading houses and a newcomer and rival bank, the Bank of Nigeria (Hopkins 1970; McPhee 1971). Secondly, there were growing concerns with the rapid expansion in the volume of silver coin circulating in British West Africa, which could have a severe effect on monetary stability in the United Kingdom in the case of a shock in the colonies (Hopkins 2014).[33] Besides, as trade operations expanded, it was increasingly inconvenient to settle or transport and count large quantities of silver coins (Clauson 1944). Finally, the colonies were buying large amounts of British silver coins from the United Kingdom at a price much above its intrinsic value, thereby accruing much seigniorage profits to the Imperial Government and not to the colonial territories (Clauson 1944; Hopkins 1970; Helleiner 2003).

These anomalies, coupled with growing pressures from the official circles in the colonies, prompted the setting up of the Emmott committee in 1911 (Clauson 1944; Hopkins 1970; Olaniyan 1971). The committee recommended introducing a distinct common currency for all the British West African colonies. Subsequently, the West African Currency Board (WACB) was formally inaugurated in 1912. An independent board was set up to supervise the supply of the new currency, manage reserves based on gold and securities, and facilitate convertibility into sterling, from its headquarters in London. Its reserves backed the money, though it was held at parity with the sterling.[34] The seigniorage profits from issuing the new currency were to support the Colonial Government developmental projects within the colonies. Besides, issuing and

[33] The concern was the stability of the coin value in the region. This is because the face value of the British silver coins was well above their metallic value (token coin) and because they were not backed up by a local reserve of gold, there was a risk that a crisis of confidence might produce a depreciation of their value (Helleiner 2003). Furthermore, it was feared that a trade depression will result in a temporary contraction of the currency circulating in the colonies and will be liable for the return of silver coins from the colonies to the UK (Adomako 1962)

[34] The system established was not a gold exchange standard, but a sterling exchange standard. Meaning, when the British silver depreciated in terms of gold, so too did the West African pound (Hopkins 1970).

storing the common currency in West Africa was discharged by the BBWA, acting as agent for the board (McPhee 1971).

The first of the new coins were introduced in 1913, and the notes followed in 1916. The new silver coinage was minted in denominations of two shillings (2/-), one shilling (1/-), sixpence (6d) and threepence (3d) and the denominations of the notes were; £1, 10/-, and 2/-. In 1916, the first notes were issued in Nigeria and subsequently introduced in the Gold Coast, Sierra Leone and the Gambia[35] (Clauson 1944; McPhee 1971). The Europeans and the educated natives widely used the notes, but other natives received them with reluctance, although the Government did its best to remove ingrained prejudices by printing notices and verbal instructions. Consequently, the West Africa pound became the only legal tender for payment and was convertible only within the West Africa region (McPhee 1971). The evolution of a common currency in British West African colonies became fully established by 1922,[36] except modifications in the denominations and design of the notes and coins issued. The currency mostly remained the same until the countries eventually attained independence in the 1950s and '60s (Adomakoh 1962).

The reports of the West African Currency Board proved as the prototype of the standard monetary system in colonial territories (Kirk-Greene 1960). Monetary integration was achieved partially as the use of common currency: From the colonial authorities' point of view, it assisted the development of trade between West Africa and the United Kingdom, while at the same time relieving the mother country of all responsibilities toward the currency of the colonies. So from the West African point of view, the Currency Board system gave stability to and confidence in the colonial currency by the continued absolute parity with sterling; it practically eliminated the risk of inflation by providing strict control over the currency issue; it corrected any tendency toward the accumulation of deficits in the balance of payments by ensuring that the local currency and sterling were automatically convertible; and it provided some additional

[35] The Gambia, one of the strongholds of the French five-franc piece, eventually absorbed the new currency notes in March 1918.

[36] By 1922 sterling silver had virtually disappeared from British West Africa, and the new monetary system had become fully developed (Hopkins 1970)

revenue, which had not been available to the colonies before 1912. (Adomakoh 1962; McPhee 1971; Helleiner 2003).

ii. Franc zone

The economy of Francophone West Africa[37] also went through a fundamental transformation during the colonial era and the development of money and financial institutions, which somehow followed a similar pattern like the British West African countries (Olaniyan 1971). Generally, the French colonies were organised under the French West African Federation. As already established in section 3.3.1, the French imperial government also sought to replace the '*indigenous*' medium of exchange with modern money (Manning 1998). By the Royal Ordinance of France in 1826, the currency of French colonies in Africa was assimilated to that of France. The French franc became the currency of French colonies in Africa. Additionally, the Banque Du Senegal was established in 1853 as the first bank created by the French in French West Africa colonies.

The creation of the bank facilitated continental trading and enabled the colonial authorities to drive West African countries into a monetised economy (Manning 1998). There was an impressive growth in the supply of money in the colonies. It demonstrated the West Africans switching from their old monies to French francs. Nevertheless, the increased circulation of the French franc in West Africa was of great concern to the Imperial authorities. To minimise the risk of France's domestic monetary system being disrupted by the sudden repatriation of fiduciary coins, French policymakers established the Banque de l' Afrique Occidentale (BAO) in 1901 with authority to issue French currency in its African colonies (Helleiner 2003). Prior, the Banque Du Senegal was liquidated in 1901 to make way for the BAO. The BAO administered the common currency of French West Africa, although it was a private investment bank, the board always included colonial officials, becoming an administrative arm of the colonial governments (Olaniyan 1971; Manning 1998).

[37] The French West African colonies included; Ivory Coast, Dahomey (Benin), French Sudan (Mali), Mauritania, Niger, Senegal, Togo and Upper Volta

At the end of the First World War, the French determined that their colonies should be tied more to the economy of the metropolitan, for instance, trade (import and export) of their colonies should be directed towards France. Hence, the French authorities undertook several investments in the form of concessions and financial support for the BOA in the colonial economies. However, Manning (1998) argues that the strategy was capital extraction instead, which became the source[38] of French wealth in West Africa. In the aftermath of World War Two, France abandoned its commitment to the use of French francs in its African colonies in 1945 and subsequently created a distinct currency known as Franc des Colonies Françaises d'Afrique (CFA franc) for various colonial regions.[39] The CFA francs creation was to prevent wartime inflation in France from being exported to the colonies (Helleiner 2003). Moreover, the metropolitan French franc devalued in December 1945 to correct for wartime inflation (Stasavage 1996). These reforms in West Africa were also part of the Bretton-Woods agreements, whereby France had the continued right to control the currencies of its African colonies, as part of the after-war recovery strategy (Manning 1998; Couharde et al. 2013).

The CFA Franc zone has two monetary unions: The West African region was referred to as Financial Community of Africa while those of the Central African Zone as the Financial Cooperation in Central Africa and both were of equal value. Initially, the currencies were established with values of 1.7CFA=1FF but later changed to 2CFA=1FF in 1948 when the metropolitan franc was devalued again (Stasavage 1996; Helleiner 2003). The nominal parity altered during the currency reform of 1968 at 50CFA=1FF. This parity remained unchanged until the 1994 devaluation. The Banque de France initially issued the CFA franc, but this responsibility later transferred to two regional issuing banks created in 1955; the Central Bank of Equatorial African States and Cameroon, later renamed the Bank of Central African States (BEAC), and the Central Bank of West African States (BCEAO). The central bank's headquarters were initially in Paris (Fielding 2002). However, Medhora (1992) argues that the transition of banks issuing notes in the Franc zone shows that the nexus of monetary

[38] Taxes, and import/export duties were sources of extracting wealth from the AOF
[39] Equatorial Africa, West Africa, Somaliland, Madagascar, Reunion, St. Pierre and Miquelon

operations has become more African and more flexible after independence, though this subjected to lots of criticism.

In summary, there is an indication of monetary integration within both the French and British colonies in West Africa since they were brought together to create a single currency zone with a fixed parity to the French franc and the sterling. However, they were not without criticisms. The main criticism, which was both political and economic was that the currency boards were exploiting the West African colonies. When the colonies have a favourable balance of payment, the currency boards accrue more sterling or franc (reserves), which were deposited in London and Paris, instead of directing funds towards diversifying and developing the local economies (Shannon 1950; Hopkins 1970; Akinrinsola 2003).

Also, though we do not have data on the level of intra-West African trade, the literature demonstrates that the common currencies expanded international trade; export of commodities and import of manufactured goods from Europe (Helleiner 2003; Hopkins 2014). The nature of export, mainly; commodities, raw materials produced in the colonies were not in high demand within the sub-region. Furthermore, aside from the common currencies, medical advances, and improvement in transportation such as railways, roads were crucial to the considerable expansion of intercontinental commerce (McPhee 1971; McKenzie 1983). Manning (1998) and Bah et al. (2017) argue that the rail lines[40] provided an essential link from the seaport to the navigable portions and did not follow the traditional trade routes that existed previously; hence, it was of little use for intra-West African trade at the time. This is because, long before trading with the Europeans, there was a network of land and sea routes that remarkably served the needs of West Africa trade. For instance, land routes linked so many ethnic groups in the region; the Hausa (in Nigeria) with Gurma (in Dahomey) and Gonja (in Ghana), Masina (Mali) was linked with Kong (Ivory Coast) and with Ashanti and so on (Guyer 1995). The rail lines did not connect major West African towns or commercial centres. They instead served the purpose of

[40] The first railroad in francophone sub-Saharan Africa was built in the years from 1883 to 1885 and linked the ports of Dakar and St.-Louis in Senegal. Other major railroads, all constructed before World War I, including the extension of the Senegal railroad from Kayes on upper Senegal to Bamako on the Niger in the 1890s, and later a link from Kayes to Dakar (Manning 1998).

linking the sources of raw materials to European purchasers, and the European manufacturers to West African purchasers. Though common currencies existed during the colonial era, they could not support regional economic cooperation such as intra-regional trade.

Nonetheless, despite the emphasis on external trade, Africa only produced very little in the total world output. For instance, before 1939, Africa produced less than 5% of the world output of primary products, and this trend continues today (Hopkins 2014).

3.4 Post-Independence

In the previous sections, we observed that the pre-colonial era in West Africa gradually evolved toward the use of cowrie shells as a common currency. During the colonial period, the French and British West African colonies participated in some form of the monetary union (currency boards) based on the Franc and Pound Sterling, respectively (Fielding 2002). However, after independence, the idea of forming a regional economic or monetary cooperation among the Anglophone West African states was not deemed a matter of urgent consideration (Akinrinsola 2003). Consequently, the WACB dissolved as the various British West African colonies achieved political independence in the late 1950s and early 1960s. The new countries preferred complete economic freedom, with an independent central bank, own currency,[41] halting the process of economic and monetary cooperation within the region (Fielding 2002; Kenen and Meade 2010).

On the other hand, most of the newly independent states in the French West Africa colonies retained close economic links with the former metropolitan power (Cobham and Robson 1997; Fielding 2002). Following independence in the 1960s, France reviewed the existing monetary agreement with the former colonies (emphasis in West African countries),[42] leading to the establishment of the West African Monetary Union (WAMU) in 1962 (Medhora 1992; Manning

[41] Mainly practiced floating exchange rate policies

[42] Guinea in 1960 undertook an independent monetary reform; created own currency, Guinea franc, and national central bank. Mali also left the WAMU and established its money in 1962.

1998; Couharde et al. 2013).[43] At the time of founding WAMU, its membership comprised the Republics of Côte D'Ivoire, Dahomey (now Benin), Mali, Niger, Mauritania, Senegal, Togo and Upper Volta (now Burkina Faso). This section will cover the developments in monetary cooperation in West Africa after independence and highlight current initiatives towards monetary union in the sub-region.

3.4.1 ECOWAS Efforts at Regional Monetary Integration

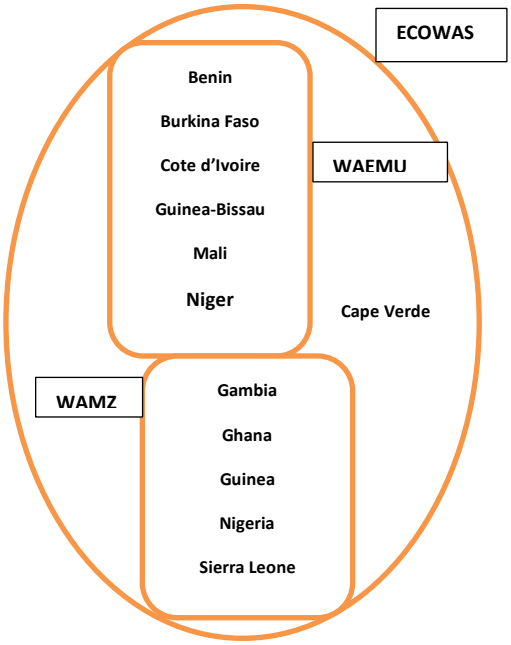
The idea of regional integration and subsequently, monetary integration began to gain ground because the West African economies were increasingly marginalised on the international front (Akinrinsola 2003).[44] To synthesise the often-divergent interests of these groups and foster closer economic cooperation in the region ECOWAS was formed with the signing of the Lagos Treaty on 28th May 1975 by 15 West African states. This was the first formal attempt to unite the Anglophone and Francophone countries in the region after independence. Currently, ECOWAS member countries include eight francophone nations, four former British colonies (The Gambia, Ghana, Nigeria, and Sierra Leone), two former Portuguese colonies (Cape Verde and Guinea Bissau), as well as Liberia, which was never a European colony.[45] Figure 3.2 illustrates the composition of WAMZ and WAEMU countries within ECOWAS as discussed in this section.

[43] In the monetary domain, existing colonial currency unions were confirmed in post-independence West and Equatorial Africa and transformed into monetary unions with independent central banks (Cobham and Robson 1994).

[44] It's worth noting that the idea of "regional integration projects in Africa was also driven by the aspirations of the founding fathers of African independence for closer political and economic integration of the continent to promote African unity, foster self-reliance and enhance collaboration and eradicate colonialism" (Saho 2016).

[45] The seven non-WAEMU countries in ECOWAS have not tied their monetary or exchange-rate policies together: each has its currency, operates its independent monetary policy, and has a floating exchange rate (Cape Verde, however, pegs its domestic currency to the euro) (Kenen and Meade 2010).

Figure 3.2 Membership of ECOWAS



Since its formation in 1975, ECOWAS has pursued a broad agenda, including the quest for regional economic cooperation, development and integration, encompassing trade, shared institutions, and monetary union in the sub-region (Ojo 2003; Masson and Pattillo 2005; Kenen and Meade 2010). Per the objective of this study, the discussion will be limited to monetary integration arrangements. One crucial instrument ECOWAS hopes to use to promote economic integration and thereby boosting intra-regional trade is common currency (Robson 1983; Masson and Pattillo 2002). The justification is strengthened by the economic benefits postulated in the literature, specifically potential intra-community trade increase (see chapter 2). Generally, intra-ECOWAS trade is low in comparison with other regional blocs as shown in Table 3.1. Between 2000 and 2015, overlooking informal trade, intra-regional export as a percentage of total exports has rarely increased beyond 10%.

Table 3.1 Intra-Regional Trade (% of total export)

	WAEMU	ECOWAS	ASEAN	EU28	ECOWAS share in world Exports (%)
2000	15.76	9.15	23	67.73	0.47
2001	13.64	9.66	22.38	67.31	0.446
2002	12.06	10.95	22.69	67.49	0.453
2003	14.99	9.89	24.72	68.56	0.488
2004	15.2	8.91	24.87	68.52	0.582
2005	14.35	9.54	25.25	67.83	0.639
2006	14.23	8.34	24.87	68.10	0.644
2007	15.2	8.35	25.19	68.12	0.624
2008	14.88	9.18	25.42	67.19	0.693
2009	12.16	9.52	24.6	66.55	0.664
2010	12.54	7.44	24.99	64.83	0.75
2011	11.49	7.1	24.91	63.74	0.846
2012	13.16	7.4	25.92	61.92	0.842
2013	13.22	9.03	25.96	61.44	0.766
2014	15.55	7.97	25.39	62.61	0.726
2015	12.67	10.33	24.29	62.59	0.53
2016	13.54	11.67	24.01	63.74	0.44

Source: Authors' computation based on UNCTAD 2017 data, ASEAN (Association of Southeast Asian Nations) EU28 (European Union)

Therefore, the very first attempt at regional monetary integration was the establishment of the West African Clearing House (WACH), legally commissioned on 25th June 1975 and started operations in July 1976 (Osagie 1979). The objective of the multilateral clearing mechanism was to promote the use of the currencies of member states for intra-regional trade[46] and to promote monetary cooperation within the sub-region. In effect, the payment mechanism

[46] The low level of intra-West African trade resulted from the absence of exchange markets in the sub-region and the use of foreign currencies such as the US dollar in the settlement of international obligations between West African (Osagie 1979)

devised for the Clearing House was aimed at reducing transaction costs, shortening the period it takes to effect payment and reducing the volume of paperwork required for intra-West African trade (Osagie 1979; Ojo 2003).

Under this arrangement, the West African Unit of Account (WAUA)[47] was introduced as the benchmark rate for determining the relative strengths of the currencies[48] in the WACH's payment mechanism. The WAUA is akin to the special drawing rights (SDR) of the International Monetary Fund (IMF). This, in part, facilitated in the evacuation of the problem of inconvertible currencies within the region. The WACH failed due to factors including; low transactions, non-conformity and weak commitment by member states to adhere to the clauses of the agreement (Akinrinsola 2003).

The difference between the CFA zone and former British colonies currencies continue to hinder intra-community trade. In practice, trade settlements were carried out in major reserve currencies, which included the French Franc, the Dollar, and the Pound, while payment orders were processed by foreign banks stationed in the US, London and Paris (Osagie 1979). Sy (2014) also report about 50 per cent of intra-African trade financial settlements are conducted by banks outside the continent at extra cost due to exchange rate conversion. The incurring of high transaction costs serves as a disincentive for trade and investment, creating some rigidity in the sub-region.

In 1987, a timetable for moving into a monetary union was first outlined under the auspices of the ECOWAS Monetary Cooperation Programme (EMCP) (Ojo 2003; Kenen and Meade 2010). The introduction and implementation of a set of macroeconomic convergence criteria and other measures set out were expected to pave the way for the establishment of a single monetary zone and a standard central bank for the sub-region by the year 2000.[49] However, the EMCP suffered several setbacks, which delayed its implementation and the initial timetable for the monetary union 1992, was postponed several times.

[47] Equivalent to one Special Drawing Right (SDR) of the IMF

[48] The currencies involved included the CFA Franc (for the Franc zone), the Gambian Dalasi, Ghanaian Cedi, Liberian Dollar, Malian Franc, Nigerian Naira and the Sierra Leonean Leone

[49] Moreover, the EMCP sought to develop further the WACH into a system of linked exchange rates tied to the clearinghouse unit of account to improve its payment mechanism and enhance intra-regional trade. Subsequently, the convergence mechanisms were revised in June 2012 and December 2015 by the Authority of Heads of State and Governments. The revised convergence criteria in May 2015, was rationalized to six criteria, comprising four primary criteria and two secondary criteria out of the previous eleven (Wama Speech) (see table 3.3).

Primarily due to the insufficient political commitment, and the different stages of monetary harmonisation marked by the realities of the existence of the CFA franc zone group of eight countries (Ojo 2003; Kenen and Meade 2010).

During 1996, the WACH metamorphosed into the West African Monetary Agency (WAMA) because of operational inadequacies and the fact that the objectives for its establishment were not fully realised. The Agency mandate was broadened to include responsibility for monitoring, coordinating and implementing the EMCP, geared towards the eventual conduct of the single monetary policy and the establishment of the ECOWAS single currency (ECOWAS). Also, WAMA is expected to facilitate regional trade through the maintenance of close surveillance over the monetary, fiscal and exchange rate policies of member states to encourage a stable intra-regional exchange market conducive to the enlargement of trade.[50]

Considering the constraints, the institutions created to advance ECOWAS monetary integration have faced, the authorities felt that integration in the whole of ECOWAS is difficult because of some differences in governance inherited from the colonial epoch.[51] As a result, ECOWAS saw the creation of two monetary zones as the best option (Debrun et al. 2005; Fielding and Shields 2005). A brief discussion of the two monetary zones follows:

3.4.2 WAEMU

The West African Francophone countries monetary arrangement evolved into the West African Economic and Monetary Union (WAEMU) as part of the ECOWAS integration strategy. The WAEMU was established by a treaty signed in Dakar on 10th January 1994 by the Heads of State and Government of seven West African countries using the CFA Franc. The aim of the treaty- built on the achievements of the WAMU- was to create a new framework for promoting economic integration and development of member countries and provide the credibility required to sustain the fixed exchange rate for the common currency

[50] Currently, WAMA is facilitating the alignment of WAMZ and WAEMU to prepare for the ECOWAS economic and monetary union (Alagidede et al. 2012).

[51] Based on the 1993 revised treaty, ECOWAS seek to promote co-operation and integration, leading to the formation of an economic union in West Africa.

(Debrun et al. 2005; Fielding and Shields 2005). The eight current member states include; Benin, Burkina Faso, Cote d'Ivoire, Guinea-Bissau (joined in 1997), Niger, Senegal, Togo, and Mali (re-joined in 1984), all former French colonies (except Guinea-Bissau, a former Portuguese colony), and their ties with France remain strong even today.[52]

The WAEMU is a complete monetary union with a central bank, la Banque Centrale des Etats de l'Afrique de l'Ouest (the BCEAO), common currency; CFA franc (CFA stands for "le Franc de la Communauté Financière Africaine" since 1958; from 1945 through 1958, CFA stood for "Colonies Francaises d'Afrique"), and pooled international reserves. The headquarters of BCEAO is in Dakar,[53] Senegal with national branches in member states. The BCEAO is the sole issuer of currency in the Union, and the French Treasury has a historical obligation to guarantee the unlimited convertibility of the CFA francs for French francs (now euros) at a fixed rate, making it a convertible currency on the world scene (Fielding and Shields 2005). Before 1994, the CFA franc has been pegged to the French Franc at the rate of CFAF 50 = FF 1, after which it was devalued to CFAF 100 = FF 1 in 1994. Now, since the launch of the European currency, the CFA franc is pegged to the euro at the parity of 655.957 CFA = 1 euro. The pooled international reserves are deposited in a special operating account in Paris held by the French Treasury, and each member country's contribution must constitute at least 65% of its total reserves (Couharde et al. 2013).[54]

It has been argued that the CFA Franc zone has benefited from the relative monetary stability of the union. The fixed parity to the French franc (now euro) arrangement limits the zone's control over its monetary policy and thereby enables members to stabilise price levels and enhance credibility relative to the non-WAEMU countries. Jones (1969) contended that France's continuous participation in the union ensured credibility in the functioning of the system, thereby preventing members from pursuing unsound policies. Consequently,

[52] For more details see (http://www.uemoa.int/en).
[53] The headquarters of the central bank for the franc zone continued to be in Paris, France but were later moved to Africa in the reforms of 1972 (Bach 2016).
[54] Except those needed for current expenditures by a member government, and for meeting a member's obligations to the International Monetary Fund, deposited with the Bank for International Settlements or other central banks, or used to underwrite short-term bonds in the international financial market.

WAEMU has been hailed as one of the successful existing monetary unions, low inflation levels, more integrated- became a customs union with a standard external tariff in 2000 - and contribute a significant proportion of intra-ECOWAS trade relative to non-WAEMU members (Fielding et al. 2005). For instance, intra-WAEMU exports were 15.8% and 15.6% of their total world exports in 2000 and 2014 while intra-ECOWAS exports were 9.15% and 7.97% in the same period (see Table 3.2).[55]

On the contrary, though the CFA Franc zone has been one of the oldest existing monetary unions, overall macroeconomic performance has been unsatisfactory. Problems include slow growth and weak intra-community trade (Nitsch 2004; Liedong 2017). Furthermore, the fixed exchange rate with the French franc (now euro) can undoubtedly be seen to have contributed to closer trade ties with Europe instead (Sugimoto 2008). Current data show that WAEMU countries trade more with France and the European Union than among themselves.[56] To conclude, the implication is that the trade benefits of a common currency for ECOWAS may appear limited unless ECOWAS hope to trade more with itself or attract more investment after the launch.

3.4.3 WAMZ

The success of WAEMU, reinvigorated the non-WAEMU members to establish a second monetary zone, the West African Monetary Zone (WAMZ), intended to accelerate ECOWAS broader monetary union agenda (Tsangarides and Qureshi 2008; Kenen and Meade 2008). In 2000, the WAMZ was formed by Heads of States of The Gambia, Ghana, Nigeria, Sierra Leone and Guinea in Accra, Ghana. Subsequently, Liberia joined in 2010 as the 6th member (Odularu 2009).

The fast-track integration strategy dubbed, ‘Accra Declaration’ set forth the objectives, action plan and institutional arrangements of WAMZ. In the first phase, the new zone will launch a single currency called ‘ECO.' Later, WAMZ and WAEMU will merge to form a broader monetary union in ECOWAS in the

[55] UNCTAD Database 2018
[56] The data source is the UNCTAD Database 2018

second phase (Bakoup and Ndoye 2016). The view is that it would be easier to merge the two currency zones than the present multiplicity of currencies existing in the sub-region. In other words, it was considered unfair to arrange a merger between an organised zone that is working and an unorganised coalition of countries with separate currencies (Fielding and Shields 2005; Houssa 2008). Also, the introduction of *Eco* is conditional on the convergence of a set of specific quantitative and qualitative macroeconomic indicators.[57] Table 3.2 presents the ECOWAS Monetary Cooperation Programme (EMCP) and WAMZ convergence criteria. The EMCP targets all ECOWAS members while the WAMZ indicators are for the six member countries.

[57] These are comparable to the Maastricht type convergence criteria.

Table 3.2 WAMZ and ECOWAS Convergence Criteria

EMCP		**WAMZ**	
Primary Criteria		*Primary Criteria*	
Average annual Inflation rate	Single digit (<10%)		<10%
The ratio of the budget deficit (including grants) to GDP	Lower than or equal to 3% of GDP		≤-4%
Central bank financing of budget deficits.	≤10% of the previous year's tax revenue.		≤10% of the previous year's tax revenue
Gross external reserves	≥ 3 months of imports		≥ 3 months of imports
Secondary criteria		*Secondary criteria*	
Nominal exchange rate	Stable (+/- 10%)	Exchange rate stability	Stable (±15%)
The ratio of total public debt to GDP	Not more than 70%	Tax revenue/GDP ratio	>20%
		Public investment from domestic receipts	>20%
		Real interest rate	>0
		Salary mass/total tax revenue	<35%

More importantly, the West African Monetary Institute (WAMI) was set up in Accra, Ghana, on January 2001 and began operations in March 2001 to undertake technical preparations and groundwork for the establishment of a common West African Central Bank and the common currency. The mandate includes implementing policies meant to facilitate deep trade integration, financial sector integration, payment system development and statistical harmonisation (Ojo 2003). Initially, the authorities called for WAMZ common currency in 2003, and subsequent merger with WAEMU 2004, but this has been postponed many times-2003, 2005, 2009, 2015 and 2020-because the

convergence criteria have not been met by some countries (Kenen and Meade 2010; Bakoup and Ndoye 2016). The successive postponements and non-compliance by the deadline for launching the single currency have fuelled the debate whether there is still the political will among the countries to execute this project in 2020. It is a legitimate question, but not the focus of this study. Aside from the political will, the convergence criteria seem to be the hurdle of the single currency project. Liedong (2017) argues that unless the convergence criteria are revised to reflect the real macroeconomic situation in the zone, the single currency project will remain work-in-progress for the unforeseeable future. Thus, the fundamentals are far from realisation because of internal and external shocks facing these countries over which they do not have much control (WAMA convergence report 2016).

In summary, ECOWAS failure to merge WAMZ with WAEMU will have more profound implications in attaining deep economic integration stipulated in the 1993 revised treaty. Moreover, the extent to which ECOWAS influences decisions in the region could be limited. Hence, the existence of WAMZ and WAEMU poses challenges as well as opportunities for ECOWAS concerning policy coordination or whether regional institutional convergence can be achieved.

3.5 Chapter Summary

This chapter has provided an account of the historical changes of monetary systems in the pre-colonial, colonial and post-independence West Africa. This chapter aimed to deepen our understanding of the evolution of monetary systems and its relationship with trade in the region. Further, to reflect and identify the extent to which the creation of WAMZ could further strengthen economic integration and intra-community trade in the sub-area.

A review of the West African's past suggests that, before European contact, common currencies such as the cowries, barter, and gold existed, although their use was often restricted to certain types of transactions or specific groups of people (Hopkins 1970; Johnson 1970; Guyer 1995; Hopkins 2014). Therefore, the development of continental trade with the European sea traders was grafted on to the pre-existing system of commerce in the region (Ofonagoro 1979; Manning 1998).

Colonialism signalled a move towards standardised monetary systems and the use of modern common currencies. The fact that West Africa came under the control or influence of two central metropolitan powers segregated the currency of West Africa into two monetary zones; the West African shilling for the British colonies and the CFA Franc for the French colonies. The chapter established that monetary integration was achieved partially as the use of common currencies resulted in the removal of exchange rate costs and associated currency transaction costs (Hopkins, 2014). However, critics have argued that the monetary reforms halted the natural evolution of the indigenous monetary systems, and the common currencies did not encourage intra-community trade (Fuller 2009).

After independence, the CFA countries continued to maintain the colonial monetary systems which evolved subsequently into a full monetary union known as WAEMU. In contrast, the Anglophone countries abandoned the WACB and introduced new national currencies and central banks. These currencies have had their challenges; exchange rate uncertainties, inconvertible within the sub-region, and among others. Later, the non-WAEMU countries formed a second monetary zone knows as WAMZ. The motivation is that using

a common currency would spur intra-community trade (Decks 2016). Currently, the focus of ECOWAS is on aligning WAEMU and WAMZ, as preliminary steps of establishing a union-wide common currency in 2020, although there has been a lack of progress. Table 3.3 provides a summary of the historical changes of monetary arrangement in West Africa discussed in the above paragraphs.

In conclusion, although a common currency will help address the issue of multiple currencies and exchange rate fluctuations that affect intra-regional trade, the chapter argued that a common currency would not adequately address the recurrent low intra-ECOWAS trade. The level of trade between the WAEMU countries is low, even though they continued to use a single currency after independence. The institutional structures during colonialism facilitated specialisation in the growth of agricultural and "extractive" production for export to international markets (Guyer 1995; Hopkins 2014). The demand for these commodities is non-existent in the sub-region.

Table 3.3 Development of monetary arrangements in West Africa

	Pre-colonial	Colonialism		Post-independence	
	West Africa	Anglophone	Francophone	Anglophone	Francophone
Common currency	Y	Y	Y	N	Y
	Cowries/Barter	CFA	West African Shilling	-	CFA

Source: Authors' compilation. Note: **Y=yes**, the monetary arrangement exists; **N=no**, the monetary arrangement did not exist

Chapter 4 Real Exchange Rate and Asymmetric Shocks in the West African Monetary Zone (WAMZ)

4.1 Introduction

This chapter focuses on one of the main issues in the debate of the monetary union in the West African Monetary Zone (WAMZ), the degree of asymmetry in macroeconomic shocks. The WAMZ, now composed of 6 countries (Ghana, The Gambia, Guinea, Liberia, Nigeria and Sierra Leone), was created in 2000 as a second monetary zone in addition to an already existing West, African Economic and Monetary Union (WAEMU).[58] The project aimed to fast track and facilitate the deepening of economic integration in the Economic Community of West African States (ECOWAS). The intention is that WAMZ and WAEMU will be merged to form a single monetary zone in West Africa by 2020 to enable members to exploit both institutional and economic benefits (Debrun et al. 2005; Fielding and Shields 2005; Masson and Pattillo 2005; Masson 2008; Couharde et al. 2013; Ekpo and Udoh 2014).

The main economic cost of a monetary union to WAMZ discussed in chapter 2 results from the loss of independent national monetary policy, and the associated nominal exchange rate flexibility, as policy instruments to asymmetric shocks (Buiter 2000; De Grauwe 2000; De Grauwe and Mongelli 2005; Rubio and Comunale 2017). The degree of the cost depends on the debate about the relative merit or effectiveness of nominal exchange rate flexibility as a buffer for adjusting to asymmetric shocks, especially for small open economies (Obstfeld et al. 1996; Kamar and Ben Naceur 2007; Beetsma and Giuliodori 2010; Gervais et al. 2016). Coulibaly and Gnimassoun (2013) detailed the frequent use of exchange rates by WAMZ countries in response to economic shocks. For instance, during the 2016 falling oil prices, Nigeria floated its fixed currency exchange rate to correct a current account imbalance. The floating of the Nigerian naira after months of policy debates saw the currency

[58] WAEMU members (former French colonies) are Benin, Burkina Faso, Cote d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal, and Togo; established in 1994 with a central bank and a single currency known as the CFA franc.

immediately plummet by 40% (Lumkile 2016). On the other hand, the more similar these countries are in terms of structural measures, such as sufficiently flexible labour and capital markets (Mundell 1961; McKinnon 1963; Kenen 1969); the existence of adequate shock-absorbing mechanisms, such as interregional risk-sharing arrangement and automatic fiscal transfer schemes, (Kenen 1969; Mundell 1973; Mélitz and Zumer 1999)[59] and the presence of common shocks with a similar impact, the lower the costs in losing exchange rate stabilizing mechanisms for these economies (Tavlas 1993; Alesina and Barro 2002; Tavlas 2009; Clerc et al. 2011).

In West Africa, the degree of risk-sharing among these countries is quite low (Tapsoba 2011). The political convergence in terms of having a unified budget to facilitate financial transfers from countries experiencing a strong economy to those suffering from a recession is hindered by high government debts, which are typical in developing countries including the ones studied here (Buigut and Valev 2005; Houssa 2008). Although data on factor movement in the region is sparse,[60] it is unrealistic to assume that workers will move quickly from one country to another, even if there are no border barriers (Kenen and Meade 2010). This is due to the high costs associated with migration and retraining.

Consequently, the OCA literature points to the importance of symmetry in macroeconomic shocks of monetary union candidates. If shocks are symmetric across countries, like a negative demand shock that is common to all WAMZ countries, then asymmetrical policy response in the form of a common monetary and fiscal expansion would be adequate. However, if shocks are highly idiosyncratic, a common monetary policy will be inappropriate (Bayoumi and Eichengreen 1992; Buiter 1997; Pisani-Ferry 2013). This is the proposition that because of divergences in economic structure (the sectoral or industrial composition of production, financial structure, demand, labour market institutions etc.), the monetary transmission mechanism differs among

[59] Such an adjustment mechanism could be in terms of a unified budget, which automatically redistributes from countries experiencing a strong economy to those suffering from a recession. However, De Grauwe (2000) argues that fiscal transfers are only suited to dealing with temporary demand shocks. When the shock is a permanent one, other adjustment mechanisms will be necessary to deal with the problem (Volz 2010).

[60] Adepoju (2005) documents movement of a significant amount of labour from Ghana to Nigeria during the 1970s oil price boom. Intraregional movements of people within the group has been made easy with the introduction of ECOWAS common passport since 2000.

countries. Consequently, a common monetary policy will impact asymmetrically in different countries and sectors (Buiter 2000).

Relatively few empirical studies have used the dynamics of various macroeconomic variables to help assess asymmetry of WAMZ economies and have produced inconclusive results. For instance, Alagidede et al. (2008), Tsangarides and Qureshi (2008), Asongu (2014) and Harvey and Cushing 2015) have revealed the existence of high levels of macroeconomic heterogeneity due to the diverse economic structures of the West African countries, especially those belonging to the WAMZ. Others like Debrun et al. (2005), Coulibaly and Gnimassoun (2013) have reported evidence of macroeconomic convergence regarding competitiveness since the establishment of WAMZ convergence criteria in 2001.

This chapter provides a contemporary examination of the degree of asymmetry by assessing the behaviour of the real effective exchange rates (REER) across WAMZ countries. The dynamics of REER can have considerable effects on output and prices; providing evidence on REER behaviour among prospective monetary union candidates would suggest the potential costs of sacrificing exchange rate flexibility. A stable and coordinated REER between these countries would suggest that shocks demanding exchange rate adjustment are small, and, consequently, that the cost of giving up nominal exchange rate flexibility would be small. Conversely, large divergent REER can generate competitiveness differentials among candidates and would indicate the importance of exchange rate flexibility (see Edwards 1988b; Von Hagen and Neumann 1994; De Grauwe 1996; Balázs and Amina 2003; Coudert and Couharde 2003; Obstfeld and Rogoff 2009; Lane 2012; Dumrongrittikul and Anderson 2016).

Several approaches have improved our understanding of the link between exchange rates and macroeconomic fundamentals such as; productivity, terms of trade, trade liberalization, government consumption, oil price, and interest rates (Edwards 1988b; MacDonald 1998; Égert et al. 2006; Dufrénot et al. 2008; Tsen 2011; Chowdhury 2012; Kia 2013; Chen et al. 2017). However, the relative significance of shocks to these fundamentals and the mechanisms

through which they affect REER in WAMZ has not been extensively examined. Unlike previous literature, we focus on fundamental shocks to REER, since the REER is likely to move in response to unexpected rather than to expected changes in macroeconomic variables (Alexius and Post 2008; Kizys and Pierdzioch 2009; Dumrongrittikul and Anderson 2016). The chapter, therefore, identifies three shocks of interest from exchange rate determinants using a structural autoregressive model (SVAR) and assess how REER of WAMZ countries respond to the shocks. Notably, the increasingly large dependence of these countries on the export of primary commodities points to the growing importance of both external (such as oil price; terms of trade) and domestic (productivity; demand) shocks to the REER (Obstfeld and Rogoff 2005; Chen and Chen 2007; Obstfeld and Rogoff 2009; Chowdhury 2012; Dumrongrittikul and Anderson 2016). Therefore, the relative role of a common external shock on REERs is taken as the key indicator to characterise macroeconomic asymmetry across the countries. By asymmetry, we understand not only the prevalence of country-specific shocks that cause REER fluctuations, but also a different response to common external shocks.

The chapter contributes to the extant empirical literature through several ways: first, it investigates the long-run and short-run relationships between the REER and its determinants using a country-by-country Vector Error Correction Model (VECM) over the period 1980-2015. Second, we estimate and assess the pattern of REER misalignments using the permanent components of fundamentals as in the Behavioural Equilibrium Exchange Rate (BEER) procedure. Third, we impose long-run restrictions in a three-vector autoregressive (VAR) model to identify economically meaningful structural shocks, i.e. oil price, productivity (supply) and demand preference- to REER determinants over the period 1980-2015. We consider impulse response and variance decomposition in order to characterise asymmetries in terms of the sign, magnitude, persistence and relative contribution of the disturbances across these countries. Our broad aim is to provide an empirical analysis that can inform policy debates on whether WAMZ economies have attained adequate macroeconomic symmetry for a common monetary policy to suffice.

The rest of the chapter is organised as follows; Section 4.2 discusses the related literature. Section 4.3 provides the empirical methodology. Section 4.4 presents the data description and preliminary analysis. Section 4.5 contains data analysis and results, while Section 4.6 provides chapter summary.

4.2 Related literature

There are two main strands of related literature. The first concerns work on the real exchange rate (RER) determinants. The literature on RER determinants has been challenging. Theories - such as the purchasing power parity (PPP) - that view the exchange rate as the relative price of domestic and foreign monies have been widely criticised on both theoretical and empirical grounds (Balassa 1964; Samuelson 1964; Dornbusch 1976; Frenkel 1976; Officer 1976). The apparent critiques relate to obstacles in international trade, the lack of standardised goods baskets and different price structures between countries (Officer 1976).[61] Also, one widespread criticism by Balassa (1964) and Samuelson (1964) is the so-called Balassa–Samuelson effect. Thus, RER persistently deviates from PPP for the presence of productivity differentials in traded goods between countries.

On the other hand, many contributions have established a link between the RER and fundamental economic variables (Meese and Rogoff 1983; Edwards 1988b; MacDonald and Taylor 1993; Clark and MacDonald 1999; Kia 2013). Edwards (1988; 1989) modelled that in the short run, both real and nominal variables affect the RER while in the long run, only real variables affect the RER. Clark and MacDonald (1998) behavioural equilibrium exchange rate (BEER)[62] model directly estimate a reduced form equation of the relationship between macroeconomic fundamentals and the REER. The focus of this chapter is to first establish a behavioural link between the REER and macroeconomic variables in the WAMZ. Therefore, the BEER approach is more

[61] Rogoff (1996) argues that the incurrence of transaction costs associated with transportation, tariffs, and other impediments to trade make prices to differ between countries and thereby violate the law of one price.
[62] The BEER approach has been used extensively in the case of industrial countries than developing countries. In spite, in the literature, it is argued that the BEER model is not founded on any specific exchange rate theory and in that sense may be understood as a very general approach to modelling REER (Egert et al. 2006).

appropriate since it estimates a reduced-form equation that explains the dynamics of the REER in terms of economic fundamentals.

Empirical studies on Sub-Saharan African countries have reported long-run relationships between RER movements and fundamental determinants using time-series techniques and cross-section comparisons (Elbadawi 1994; Baffes et al. 1999; Hinkle and Montiel 1999; Montiel 1999; MacDonald and Ricci 2004; Dufrénot and Yehoue 2005; Elbadawi and Soto 2005; Iimi 2006; Roudet et al. 2007; Abdih and Tsangarides 2010; Lebdaoui 2013). These studies mainly based on the implicit assumption that there is cointegration have provided inconsistent results in terms of the signs and the magnitudes of the coefficients of the fundamentals employed. One reason for the lack of a clear and consistent pattern of results relates to how studies differ in the way they integrate proxies for fundamentals due to the lack of actual data on certain fundamentals. Furthermore, these proxies may not accurately capture the relative effects of domestic and partner countries (Christiansen et al. 2010). Therefore, the thesis computes the fundamental variables or proxies to capture the relative effect of WAMZ countries and their respective five top trading partners.

The second strand of studies relates to the empirical work on RER misalignments in terms of the deviation of actual RER from its equilibrium value and the degree at which these deviations are corrected. Most empirical studies on WAMZ countries have reported periods of macroeconomic instability or shocks in fundamentals to have been widely associated with the era of RER deviations or misalignments (Opoku-Afari et al. 2004; Youngblood 2004; Daboh 2007; Iossifov and Loukoianova 2007; Aliyu 2009; Cham 2010; Korsu and Braima 2011; Coulibaly and Gnimassoun 2013; Asongu 2014). Opoku-Afari et al. (2004) find that export price fluctuations contribute significantly to exchange rate misalignments in Ghana in the short-run. The paper further reveals that the RER is slow to adjust to equilibrium after a temporal shock, implying a lack of policy effectiveness or flexibility in the country. Policy actions like the Structural Adjustment Project (SAP) and democratic elections in 1992 and 2000 significantly contributed to the direction of misalignments.

In contrast, Youngblood (2004) reveals that RER most likely trend towards the equilibrium path after a disturbance in Ghana and the divergences in the nominal exchange rate in the short-run arise due to cyclical changes in fundamentals and policy changes. The view is reinforced in Iossifov and Loukoianova (2007) reporting a relatively fast mean reversion, i.e. a half-life of 2-3 years in Ghana's REER. In the case of Nigeria, Aliyu (2009) reports evidence of overvaluation and undervaluation in the Naira for the period 1986 to 2006, and the episodes of misalignments are consistent with periods of policy reforms. For instance, a massive inflow of oil revenues and stable macroeconomic performance accounted for undervaluation of the RER between 2000 and 2006. However, the paper finds that deviations from the equilibrium path are eliminated within 1-2 years.

In a cross-country estimation, Daboh (2007) derive the equilibrium RER for 4 WAMZ members over the period 1970 to 2006 and finds that mean reversion varies among the countries, for instance, in The Gambia, it takes one year while up to four years in Nigeria, suggesting potential price rigidities. Also, Cham (2010) reveals that between 2000 and 2005, real exchange rate variability increased substantially with an uneven degree across WAMZ members. The study suggests that the cost associated with joining a monetary union would have been higher during that period for the members. Coulibaly and Gnimassoun (2013) report that significant improvement in terms of trade during the 2000s via increasing commodity prices and better net foreign asset positions contributed to the equilibrium RER appreciation, thereby increasing the probability of having an undervalued exchange rate. Asongu (2014) acknowledges significant evidence of cross-country differences in the REER response to changes in fundamental determinants, but the paper finds a stable error correction mechanism from the panel estimations.

In summary, several studies have improved our understanding of the link between exchange rates and fundamentals, and different sources of real shocks such as oil prices, fiscal policy, and productivity shocks, have been shown to play a significant role in explaining real exchange rate movements. However, to our knowledge, no study has considered the relative significance of these shocks and the mechanisms through which they affect REER to assess

the convergence process of WAMZ countries. The chapter, therefore, focuses on fundamental shocks to REER, since the REER is likely to move in response to unexpected rather than to expected changes in macroeconomic variables. Furthermore, contrary to the existing literature the chapter expands the data set by incorporating Guinea and further evaluate the behaviour of the REER misalignments amongst member countries in order to explore any degree of REER coordination in the view of the proposed currency union.

4.3 Methodology

This chapter aims to assess the suitability of WAMZ countries for a monetary union, precisely to examine the degree of asymmetries among these countries using the REER. This section discusses the time series econometric techniques and the dataset used to achieve this aim. The empirical approach of this chapter is twofold. The first step is to assess the long-run and the short-run relationships between the REER and its determinants across WAMZ countries. We apply individual country cointegration and VECM, and further derive the equilibrium REER and misalignments for these countries. The time series techniques used are described in sub-section 4.3.1. In the second step, we impose long-run restrictions in a three-vector autoregressive (VAR) model to identify meaningful structural shocks, i.e. oil price, productivity (supply) and demand preference to three REER determinants. The structural vector autoregressive (SVAR) model is described in sub-section 4.5.4.

4.3.1 Cointegration Approach

As established in section 4.2 above, the study follows Clark and MacDonald (1998) BEER model to estimate a reduced-form equation that explains the dynamics of the REER in terms of macroeconomic fundamentals. Specifically, we assume a linear relationship between the REER and its determinants.

There are different time series estimation techniques available in the literature to estimate a reduced-form equation of the REER and its determinants. Such

methods include OLS estimation. However, Montiel (1999) argued that often studies that employ this approach assume that the series is stationary and therefore neglect the issue of verifying the time-series properties of fundamentals. Also, Nelson and Plosser (1982), Elbadawi (1994), Baffes et al. (1999) and Elbadawi and Soto (2005) discovered that time-series data evolve such that their mean and variance are not constant, especially for developing countries. That is, when the series in a model are non-stationary, each variable can meander without any tendency to return to the equilibrium path (Bierens 1996).

Consequently, recent studies have instead explored the application of unit-root econometrics in estimating long-run relationships. This is because relying on non-stationary time series data may lead researchers to wrongly conclude that two variables are related when they are not (Marcellino et al. 2006). However, Gujarati (2009) suggests that when non-stationary series become stationary by the ability of first difference or detrend, it means that cointegration is likely to exist amongst the variables. However, while the process of differencing may provide stationary variables, this can be at the cost of removing important long-run information (Maddala 2001). That is, in modelling time series, one requires assuring that the long-run relationship reflects the co-movements of variables due to underlying equilibrium tendencies of economic powers, rather than common, but unrelated, time trends in the data (Harris 1995).

Engle and Granger (1987) introduced an effective method – the Granger's Representation Theorem (GRT) - known in the literature as cointegration test, to analyse non-stationary processes without losing valuable long-run information. The cointegration technique was first introduced by Granger (1981) and later developed by Granger and Weiss (1983), Engle and Granger (1987), Johansen (1988), Johansen and Juselius (1990), Johansen (1995), and among others.

The theory of cointegration provides a unified framework for exploring the long-run relationship among non-stationary economic variables that take a systematic co-movement among them in the long run. If two-time series variables are non-stationary, but some linear combination of them is a stationary process, then they are said to be cointegrated or interpreted as long-

term relations exist between them (Bierens 1996). This means, if at a point in time, these two variables have drifted too far apart, there will invariably be a trend for them to keep reasonable proximity to each other (Enders 2008).

Therefore, we estimate the long-run relationship between the REER and its determinants using cointegrating approach. Montiel (1999) claims that cointegration-based estimates of REER determinants for developing countries appear promising in at least two respects. First, despite short samples, questionable data, and likely structural instabilities in its applications, cointegrating relationships are often found between REERs and broad fundamentals suggested by theory. Second, estimates of the effects of fundamentals on REER generally prove to be consistent with theoretical priors.

Before applying the cointegrating technique, it is necessary to assess the stochastic properties of the time series variables; to consider whether the variables are stationary or nonstationary. This procedure is critical since macroeconomic time series must be $I(1)$ before the Johansen cointegration approach can be employed (Enders 2008).

i. Unit root testing

Macroeconomic data often appear to possess a stochastic trend, and the presence of such trend influences the statistical behaviour of estimators. As a result, stationarity test is of significant interest to economists because the existence of a common trend between any two data series does not always imply that there is a meaningful economic relationship between them (Granger and Newbold 1974). Models containing non-stationary series might often lead to a problem of spurious outcome, whereby the results obtained suggest that there are statistically significant relationships between the variables in the regression model when in fact all that is obtained is evidence of contemporaneous correlations rather than meaningful causal relations (Harris 1995).

Therefore, a key preliminary step is to determine the order of integration of each variable in the model, to establish whether it is non-stationary or not. In this study, we employ different time series stationarity tests. The augmented Dickey

and Fuller (1979) and Phillips and Perron (1988) unit root tests, also known as ADF and PP unit root test, respectively. We estimate the general ADF model, which includes a constant and time trend. The ADF and PP test the null hypothesis that a time series contains a unit root (i.e., it is nonstationary) against the alternative of stationarity (Harris 1995). The appropriate length of lags will be decided upon checking the model selection criteria such as Akaike Information Criterion (AIC) and Schwartz Criterion (SC).

ii. Johansen Cointegration and Vector Error Correction Model (VECM)

The two commonly time series techniques used in the literature to examine cointegrating relationships among series are the Engle and Granger (1987)[63] and Johansen (1995) cointegration tests. The Engle and Granger procedure has been widely used in the literature since it is a straightforward and easy method. It involves using OLS regression with variables in levels. Besides, the Engle and Granger procedure is argued to perform better in small samples relative to the Johansen method. However, its weakness is that while it is applied to multiple variables, it cannot detect multiple cointegrating relations (Enders 2008).

On the other hand, the superiority of Johansen methodology over Engle-Granger technique is that it fully captures the underlying time series properties of the data and offers test statistic for the number of cointegrating vectors (Enders 2008). It is found to underperform in small samples because the estimation of a system of equations requires several lags, and this reduces the degrees of freedom substantially (Panday 2014). We address this constraint by using a sample size of 35 observations.

The Johansen (1995b) cointegration test is based on the maximum likelihood estimation method. Under the assumption that all variables are endogenous, which does not require the choice of a dependent variable[64] we estimate the Johansen procedure consistent with a reduced vector autoregression (VAR)

[63] This approach tests the residuals of cointegration regression for stationarity in a single equation whilst Johansen method that runs cointegration analysis in multivariate systems.
[64] The Johansen approach addresses the endogeneity problem of variables (MacDonald 1998).

model of order p in (2) to examine the long-run relationships that may exist among the representative variables.

$$y_{it} = A_1 y_{it-1} + A_2 y_{it-2} \ldots + A_p y_{it-p} + \mu_{it} \qquad 1$$

Where, y_{it} is $(n \times 1)$ vector of $I(1)$ variables for country i; A_t are $(n \times n)$ matrices of coefficients; p is the lag length – detail discussion presented in section 4.5.2 - and μ_t is $(n \times 1)$ vector of independent and identically distributed errors shock

The Engle and Granger (1987) representation theorem states that the existence of an error-correction representation depends on the existence of cointegration. Therefore, we specify a simple VECM[65] between the REER and the fundamentals that restrict the long-run behaviour of the endogenous variables to converge to their cointegrating relationship while allowing for short-run adjustment dynamics (Gervais et al. 2016) in equation 3:

$$\Delta y_{it} = \alpha\beta' y_{it-1} + \Gamma_1 \Delta y_{it-1} + \cdots + \Gamma_{p-1} \Delta y_{it-p+1} + \Phi D_{it} + \mu_{it} \qquad 2$$

Where, $y_t = (\ln(reer), \ln(prod), \ln(tot), \ln(oil), \ln(open), \ln(gov), rird$

is $(7x1)$ vector of variables, and $\Gamma_i = -(I - A_1 - \cdots - A_i)$ $i = 1,2,3, \ldots \ldots, p-1$, β' represents the long-run equilibrium relationships between the REER and the fundamentals, and the $\boldsymbol{\alpha}$ matrix, measure the speed of adjustment of the REER. To evaluate REER comovement in WAMZ, we expect a significant and negative $\boldsymbol{\alpha}$ coefficient for all the participating countries. This would indicate that the REER tends to stabilise itself in the event of exogenous shocks. $\boldsymbol{D_t}$, is a vector of deterministic components, such as constant, seasonal dummies and intervention dummies.

We first estimate the $\boldsymbol{\beta'}$ using the conventional Johansen cointegration tests for the time series on a country-by-country basis, by assuming that all variables are endogenous in the system.[66] Testing for cointegration using the Johansen method requires testing for the reduced rank or determining the number of cointegrating vectors in the system (Johansen 1988; Johansen 1995a).

[65] Further discussions related to VECM applications are provided by Johansen (1995a), Lütkepohl and Krätzig (2004), and Enders (2008).

[66] Johansen (1995) argue that all variables in the system must have the same order of integration. Hence, we did not include the I(0) variable, $rird$ in the cointegrating space. Furthermore, The Johansen approach does not require the choice of a dependent variable. This addresses the endogeneity issues of variables (MacDonald 1998).

Therefore, both the Johansen's trace and max-eigenvalue test statistics are used to assess whether the variables are cointegrated and if so, the number of cointegrating relationships. The drawback of using both tests is that results drawn from both might be inconsistent. The reason is that the Johansen procedure can be susceptible to the lag length and deterministic components included in the VAR system. We, therefore, applied the necessary tools in determining the appropriate lag length and deterministic components, to prevent misleading hypothesis testing (Enders 2008).

It is worth noting that, the above methodologies employed to assess the long-run relationship between the RER and determinants could pose two main challenges, according to Kubota (2009). First, even though the BEER model defines the existence of a long-run relationship among RER and its determinants, it is not always possible that the RER may be in equilibrium at every point in the long run due to imperfections, rigidities or regulations. However, the equilibrium may be achieved gradually in the long run. Therefore, the process of a short-run adjustment must complement the long-run equilibrium model in the empirical analysis. Secondly, it is essential to consider the very likely possibility of parameter heterogeneity across countries. We can assume reasonably that the six countries can differ regarding, for instance, monetary arrangements or different access to the worldly goods and capital markets —and perhaps even in the parameters characterising the long-run equilibrium.

4.4 Data description and preliminary analysis

The study employs annual data for five WAMZ member states (Ghana, The Gambia, Nigeria, Sierra Leone, and Guinea) over the period 1980-2015. The country coverage and the sample period are determined by data availability; hence, the reason for omitting Liberia. The dependent variable, the REER, is calculated using a trade-weighted index of bilateral exchange rates, adjusted by consumer prices (see appendix 4A.1). The weights used were trade weights constructed using Zanello and Desruelle (1997) technique and data from the International Monetary Fund Directions of Trade (DOTs). The computed weights

are reported in appendix 4A1. The trading partners chosen for each WAMZ country were their respective five major trading partners whose trade level accounted for over 50% out of total trade averaged for the period 2010-2014.

The nominal effective exchange rate is defined as the price of the domestic currency in terms of the trading-partner currency. We employ nominal effective exchange rates instead of bilateral exchange rates because the WAMZ members' foreign exchange transactions are conducted in a global context with the involvement of more trading partner countries in different proportions. The REER and other relevant variables are indexed to 100 in 2000 (WAMZ formation year), and an increase in the index of the REER implies a real appreciation of the domestic currency relative to the basket of currencies of the respective trading partners, whereas a decline implies a real depreciation of the domestic currency.

The domestic determinants are the relative productivity differential, $prod$ (proxy to capture the Balassa-Samuelson effect).[67] This variable is constructed from real GDP per capita in PPP[68] for each WAMZ country relative to the top 5 main trading partners using the same weights as for the calculation of the REER series. The effect of fiscal policy is captured using the proxy variable gov, defined as total government consumption as a per cent of GDP. Also, a proxy accounting for trade controls or trade openness is the variable $open$, constructed as the total trade (sum of exports and imports) as a percentage of GDP. The $open$ is omitted in the regression model for Guinea due to insufficient data for the entire observation period. Finally, we use the annual interest rate in per cent of nominal long-term bonds[69] (10 years for most countries) minus the percentage change in the CPI index from the previous year relative to its effective foreign equivalent, as a proxy for real interest rate differential *rird*.

The fundamental external determinants are Real oil prices, oil and relative terms of trade, $tot.\ oil$ is the US dollar prices of oil converted to the domestic currency and then deflated by the domestic consumer price index (CPI). tot is

[67] Clark and MacDonald (1999) used the ratio of the domestic consumer price index (CPI) to the wholesale price index (WPI) relative to the equivalent foreign (trade weighted) ratio to capture the Balassa-Samuelson effect. This ratio is designed to proxy the ratio of traded to non-traded price. However, data for WPI/PPI is not available for these countries.
[68] Real per capita GDP is used instead of real per capita GDP in PPP for countries where the latter is unavailable.
[69] Data is not available for most WAMZ countries, therefore WDI construction is used, i.e., real interest rate is the lending interest rate adjusted for inflation as measured by the GDP deflator.

constructed as the ratio of domestic export unit value to import unit value as a proportion of the equivalent effective foreign ratio. All the variables are expressed in natural logarithms except $rird$ because of some negative observations. Besides, all the series used in this study have been derived either directly or by computations using various datasets. The sources and expected signs of the variables are reported in Table 4.1. Furthermore, Table 4.2 reports WAMZ members national currencies.

Finally, the expected long-term signs of all the explanatory variables on the REER consistent with theoretical priors (see Obstfeld et al. 1996; Clark and MacDonald 1998; Clark and MacDonald 1999; Hinkle and Montiel 1999; Chen and Chen 2007) are briefly discussed:

Productivity differential $(prod)$: According to Obstfeld et al. (1996) international productivity differences between countries relative to that of the main trading partner countries can have implications on the REER, and the impact is expected to follow the Balassa-Samuelson effects (Balassa, 1964 and Samuelson, 1964). According to the Balassa-Samuelson hypothesis, there is a tendency for countries with higher productivity in the tradable sector to have sustained RER appreciation without losing competitiveness. The suggestion is that the appreciation will restore both internal and external macroeconomic balances.

The external terms of trade (tot)*:* The tot is defined as the relative price of exportable to importable. It is widely recognised for capturing exogenous changes in world prices that affect a country's REER. This, we expect to find a positive coefficient. However, the effect of tot changes on REER from a theoretical perspective is not possible to know a priori (Edwards, 1989). The ambiguity is noticeable in developing countries where most of them are primarily primary commodity exporters. Most WAMZ countries, mainly export primary commodities such as oil, gold, diamond, lumber, and or agricultural products (e.g., coffee and cocoa). The prices of these commodities are regulated in international commodity markets.

Notwithstanding, the non-diversified export, often concentrated in a small number of commodities, render their economies more vulnerable to sharp

movements in the tot (Di Bella et al. 2007). tot shocks are argued to have massive impact on fluctuations in national output and the REER. Even temporal tot shocks have a significant impact on private saving and the current account balance (Akyeampong 2006). On the other hand, an improvement in tot will impact the trade balance positively, and thus lead the REER to appreciate (MacDonald and Ricci, 2004).

Real oil prices (oil): Similarly, if the home country is more dependent on imported oil, a real oil price rise may increase the prices of tradable goods in the home country, and thereby cause a real depreciation of the home currency. Moreover, to improve competitiveness when an oil price shock worsens the term of trade, the home country would have to raise the nominal exchange rate, which would lead to a further real depreciation (Cheng 2007). Therefore, the impact of oil on REER depends on whether the home country is oil import-dependent or not.

Trade openness $(open)$: The growing degree of trade openness is consistent with a reduction in exchange controls. However, the relationship between openness (analogous to commercial policy) and REER has been demonstrated in the literature through the connection of sustainable tariff level and the equilibrium value of the RER (Arapovic 2009). For instance, lifting trade restrictions, such as a reduction in tariffs lead to a decline in the domestic price of imported goods, and subsequently REER depreciation. Consequently, raising restrictions on cross-border trade (decline is trade openness) leads to higher domestic prices of imported goods and thus should cause the REER to appreciate. The consequence of liberalisation of trade policy is sometimes ambiguous, but the empirical literature often finds a negative effect (See Dufret and Yehoue, 2005).

Government spending (gov)*:* In the literature, the impact of changes in the fiscal balance, i.e., government spending on the REER is ambiguous. According to Montiel (1999), the effect of government spending on the REER depends on which sector (tradable or non-tradable) these changes affect. If government spending falls relatively more on the nontraded sector, it will provoke excess demand pressures in that market, causing the REER to appreciate (Edwards,

1989 Froot and Rogoff (1995). However, an increase in government spending in the traded sector creates an incipient trade deficit, which requires a real depreciation in order to maintain external balance (Arapovic 2009).

The real interest rate differentials $(rird)$*:-* are frequently introduced in monetary and uncovered interest rate parity models (Maeso–Fernandez et al. 2002). MacDonald and Ricci (2004) explain that the real interest rate differential could represent several factors, ranging from aggregate demand for productivity and persistent monetary policy. For instance, if the countries preference for domestic absorption outweighs savings, the real interest rate would have to be high in an economy with less than perfect capital mobility. Concurrently, greater demand boosts the relative prices of tradable and non-tradable goods, causing an appreciation of the REER. Chudik and Mongardini (2007) argued that $rird$ is unlikely to play a significant role in developing countries due to the less developed financial markets.

The above discussions are summarised by (1):

$$\boldsymbol{reer_t = f(\,prod^{+},\ tot^{+/-},\ oil^{+/-},\ open^{-},\ gov^{+/-}, rird^{+})} \qquad 3$$

Where +/- represents real appreciation and real depreciation of domestic currencies, respectively.

Table 4.1 Variables, definitions, sources and expected signs

Variables	Definitions	Source	Expected signs
$reer$	Real effective exchange rate	IMF IFS	n/a
$prod$	Productivity differential	WDI	+
tot	Terms of trade	WDI/OECD	+/-
$open$	Openness	WDI	-
gov	Government consumption	WDI	+/-
oil	Real oil prices	IMF	+/-
$rird$	Real interest rate differential	WDI	+
cpi	Consumer price index	IFS/WDI	n/a
$trade$	Total trade (exports + imports)	DOTs	n/a

Note: +/-, represents real appreciation and real depreciation of domestic currencies, respectively.

Table 4.2 WAMZ countries' currencies

Country	Currency
Ghana	Ghana Cedis
The Gambia	Dalasi
Guinea	Guinea Franc
Liberia	Liberian dollar
Nigeria	Naira
Sierra Leone.	Leone

4.4.1 Real effective exchange rate (REER)

The REERs plot in Figure 4.1 shows considerable variation in behaviour across the five countries and time, reflecting the changing country-specific exchange rate policies. It is evident from the graph that before 1985, almost all WAMZ countries REERs consistently appreciated on average, except The Gambia where the REER continuously depreciated over the sample period. Afterwards, a sharp depreciation is observed in the rest of the countries REERs between 1983 -1986, with the break reflecting the structural economic reforms that the countries undertook in the 1980s (Alagidede et al. 2008). For instance, in Ghana, the introduction of the Economic Recovery Programme (ERP) in 1983 brought about a dramatic devaluation of the effective exchange rate after maintaining an overvalued exchange rate for most of the 1970s (Fosu 2001). The Ghanaian Cedi was floated by the monetary authorities with the onset of ERP 1983 under the guidance of the World Bank and the IMF (Boamah 2009), while in Nigeria the Naira was floated in 1986 following the introduction of structural adjustment policies. Guinea's currency was devalued in 1986. Implicit in the recommendation of a devaluation is the view that the real exchange rate is out of equilibrium; hence an effort to correct the severe overvaluation of the currency and to bring into line official and parallel market prices (WorldBank 1986).

Also, Figure 4.2 has been included to shows the discrepancies that are suppressed in Figure 4.1. The graphs clearly displace unstable REER in all the five countries consistent with discussion in Figure 4.1.

Figure 4.1 Real Effective Exchange Rate (1980-2016)

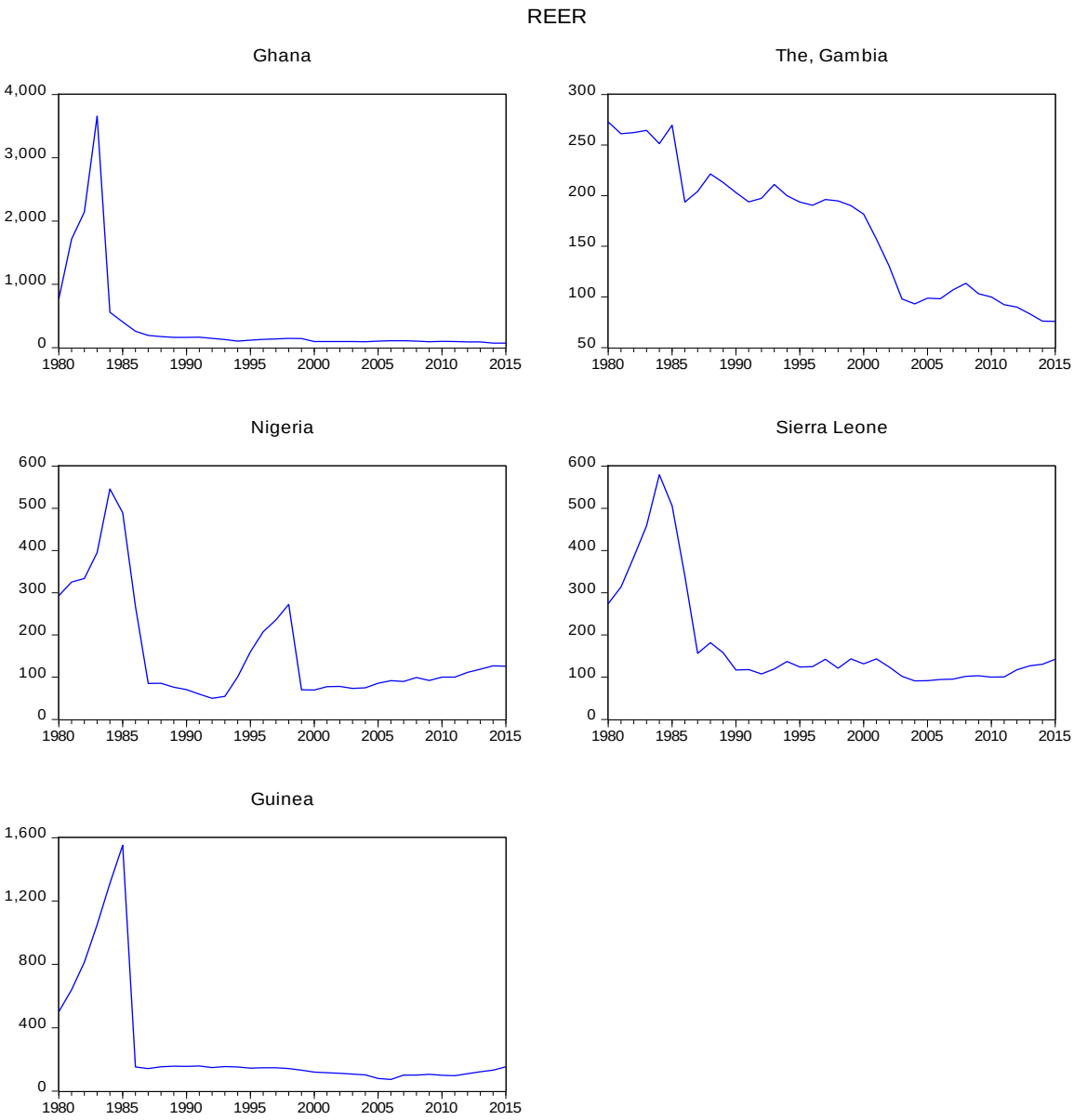
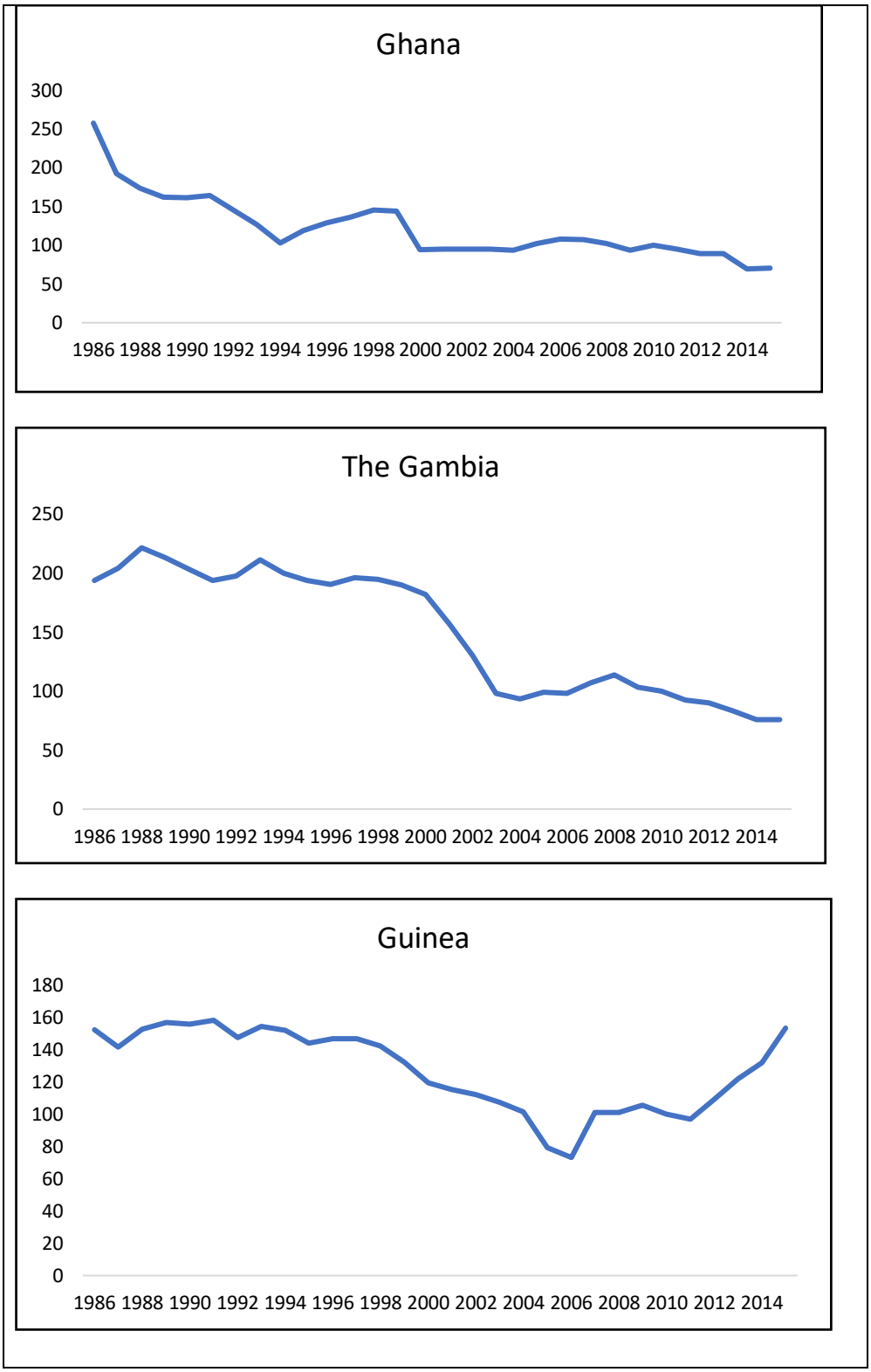
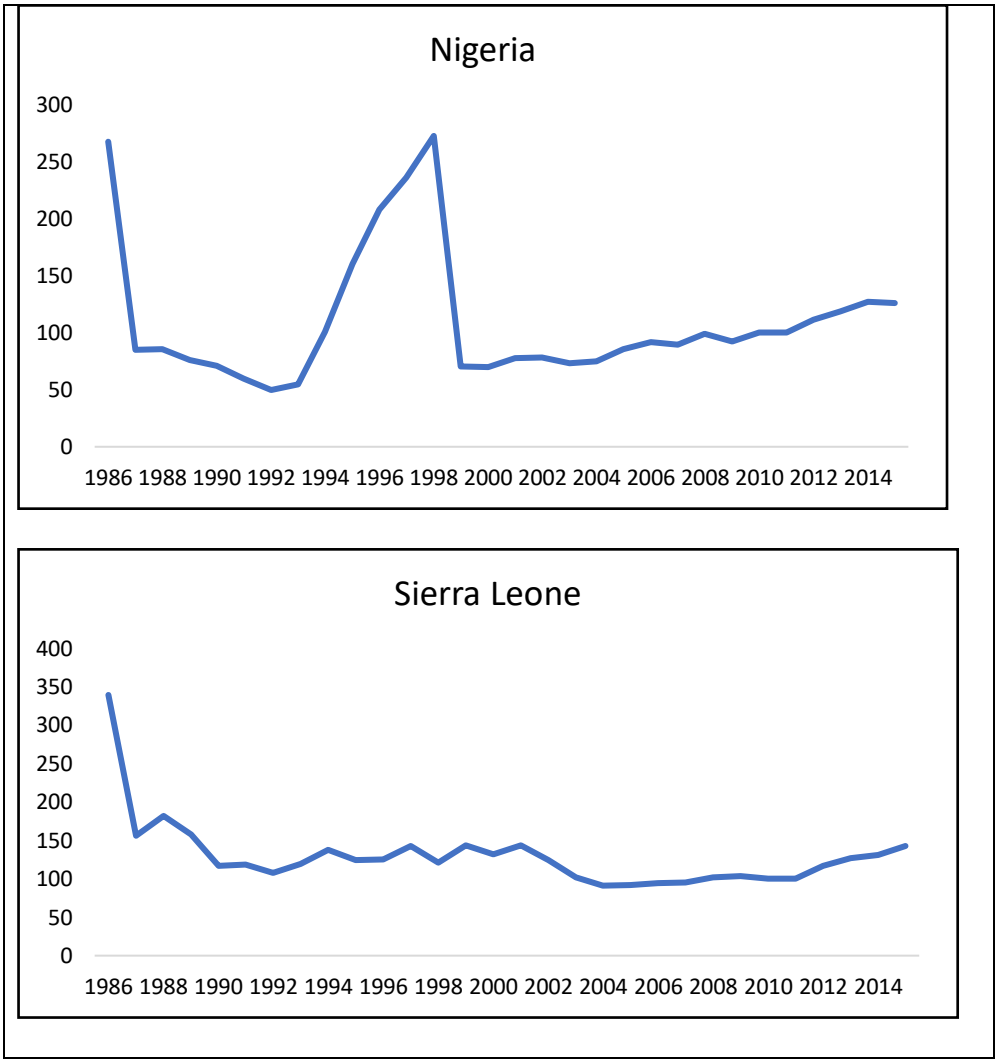


Figure 4.2 Real Effective Exchange Rate (1985-2016)





4.4.2 Order of integration

We test each variable for the presence of a unit root by using the augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests. The results from the ADF and PP tests show that in all cases the tests fail to reject the null hypothesis that the series are integrated of order one at the 5% significance level, except interest rate differentials (*rird)*, which is $I(0)$ in all five countries (See Table 4.3).

Also, we conducted a stationarity test in the presence of structural break on the REER. According to Perron (1989), if there is a break in the deterministic trend, then conventional unit root tests may produce a misleading and biased conclusion. Hence, we employ the Perron (1997) unit root test with a structural

break to examine only the REER. Despite the structural breaks, the REER of WAMZ countries remain $I(1)$, except Sierra Leone which is $I(0)$. In the case of Sierra Leone, we accept the REER as $I(1)$ based on the ADF and PP results since the Perron (1997) unit root test is not the main unit root test for the study. Therefore, we have enough evidence to validate the use of cointegration tests.

The test results are reported in Table 4.4. Interestingly, most of the breakpoints were in the 1980s, which is consistent with the major economic reforms discussed above.

Table 4.3 Unit Root Test

		ADF				**PP**				
Variable	**Observation**	**Level**		**First Difference**		**Level**		**First Difference**		**Decision**
		Constant	***Constant & trend***	***Constant***	***Constant & trend***	***Constant***	***Constant & trend***	***Constant***	***Constant & trend***	
	Ghana									
$ln(reer)$	**1980-2015**	-1.55	-1.86	-6.12***	-6.25***	-1.37	-1.87	-6.12***	-6.62***	$I(1)$
$ln(tot)$	**1980-2015**	-2.07	-2.46	-7.29***	-6.06***	-2.06	-2.44	-7.27***	-8.51***	$I(1)$
$ln(prod)$	**1980-2015**	1.65	-2.90	-3.43**	-4.03**	1.65	-2.30	-3.54**	-4.12**	$I(1)$
$ln(oil)$	**1980-2015**	-1.18	-1.83	-5.40***	-5.39***	-1.24	-1.83	-5.31***	-5.33***	$I(1)$
$ln(gov)$	**1980-2015**	-1.28	-2.91	-4.88***	-4.81***	-1.38	-3.19	-8.04***	-8.25***	$I(1)$
$rird$	**1980-2015**	-4.00***	-5.27***	-	-	-3.99**	-5.40***	-	-	$I(0)$
$ln(open)$	**1980-2015**	-2.92	-2.80	-6.09***	-7.63***	-1.39	-1.67	-4.81***	-5.03***	$I(1)$
	The Gambia									
$ln(reer)$	**1980-2015**	-0.27	-2.46	-5.12***	-5.08***	-0.21	-2.22	-5.12***	-5.08***	$I(1)$
$ln(tot)$	**1980-2015**	-2.43	-2.84	-6.24***	-6.15***	-2.47	-2.31	-6.32***	-6.21***	$I(1)$
$ln(prod)$	**1980-2015**	-0.97	-2.52	-7.61***	-8.19***	-0.88	-2.51	-7.80***	-7.62***	$I(1)$
$ln(oil)$	**1980-2015**	-0.86	-2.31	-5.45***	-5.35***	-0.86	-2.31	-5.43***	-5.30***	$I(1)$
$ln(gov)$	**1980-2015**	-1.90	-2.23	-7.94***	-8.13***	-1.72	-2.48	-8.70***	-9.96***	$I(1)$
$rird$	**1980-2015**	-4.46***	-5.55***	-	-	-4.49***	-5.59***	-	-	$I(0)$
$ln(open)$	**1980-2015**	-1.83	-1.92	-7.03***	-7.03***	-1.75	-1.82	-7.05***	-7.05***	$I(1)$
	Nigeria									
$ln(reer)$	**1980-2015**	-1.93	-1.77	-4.40***	-4.41***	-2.08	-1.77	-4.31***	-4.24**	$I(1)$
$ln(tot)$	**1980-2015**	-1.66	-2.01	-4.45***	-4.54***	-1.70	-1.92	-5.27***	-5.30***	$I(1)$
$ln(prod)$	**1980-2015**	-1.96	-2.71	-4.72***	-5.34***	-2.08	-2.68	-4.72***	-5.35***	$I(1)$
$ln(oil)$	**1980-2015**	-0.50	-2.91	-6.37***	-6.23***	-0.46	-2.82	-6.39***	-6.24***	$I(1)$
$ln(gov)$	**1980-2015**	-2.59	-2.62	-6.54***	-6.46***	-2.58	-2.64	-6.57***	-6.49***	$I(1)$
$rird$	**1980-2015**	-5.72***	-6.53***	-	-	-5.72***	-7.27***	-	-	$I(0)$

$ln(open)$	**1980-2015**	-1.92	-1.80	-7.57***	-7.56***	-1.93	-1.82	-7.52***	-7.52***	$I(1)$
	Sierra Leone									
$ln(reer)$	**1980-2015**	-1.40	-1.18	-4.49***	-4.56***	-1.54	-1.55	-4.47***	-4.49***	$I(1)$
$ln(tot)$	**1980-2015**	-0.65	-2.02	-4.88***	-4.78***	-0.67	-2.02	-4.88***	-4.72***	$I(1)$
$ln(prod)$	**1980-2015**	-1.79	-1.22	-5.07***	-5.37***	-1.79	-1.10	-5.07***	-5.09***	$I(1)$
$ln(oil)$	**1980-2015**	-1.88	0.08	-4.54***	-5.15***	-1.79	-0.05	-4.65***	-5.15***	$I(1)$
$ln(gov)$	**1980-2015**	-2.73	-3.08	-9.56***	-9.43***	-2.65	-3.49	-9.74***	-9.62***	$I(1)$
$rird$	**1980-2015**	-3.37**	-4.68***	-	-	-3.32**	-4.66***	-	-	$I(0)$
$ln(open)$	**1980-2015**	-2.639	-3.117	-7.12***	-7.10***	-2.767	-3.150	-7.07***	-7.07***	$I(1)$
	Guinea									
$ln(reer)$	**1980-2015**	-1.86	-1.99	-5.69***	-5.73***	-1.83	-2.07	-5.72***	-5.82***	$I(1)$
$ln(tot)$	**1980-2015**	-2.04	-2.27	-6.08***	-5.99***	-1.95	-2.23	-6.15***	-6.04***	$I(1)$
$ln(prod)$	**1980-2015**	-0.81	-1.91	-3.77**	-3.70**	-0.78	-1.65	-3.74**	-3.66**	$I(1)$
$ln(oil)$	**1980-2015**	-0.85	-1.73	-4.72***	-4.62***	-0.85	-1.91	-4.71***	-4.61***	$I(1)$
$ln(gov)$	**1980-2015**	-1.12	-0.91	-4.19***	-4.35***	-1.38	-1.16	-4.08***	-4.35***	$I(1)$
$rird$	**1980-2015**	-	-	-	-	-	-	-	-	-
$ln(open)$	**1980-2010**	-1.67	-2.29	-6.36***	-6.33***	-1.59	-2.22	-6.57***	-6.60***	$I(1)$

Note: *, ** and *** denote statistical significance at the 10%, 5% and 1% level to reject the unit root null hypothesis, respectively.

Table 4.4 Perron (1997) unit root test with structural break ln(reer)

	Levels		First difference		Decision
Country	*t-stat*	*Year Break*	*t-stat*	*Year Break*	
Ghana	-3.954 (1)	1986	-6.436*** (0)	1988	$I(1)$
Gambia	-4.203 (1)	2001	-6.249*** (0)	2003	$I(1)$
Nigeria	-4.014 (1)	1986	-5.287*** (0)	1987	$I(1)$
Sierra Leone	-4.803*** (0)	1986	-	-	$I(0)$
Guinea	-3.926 (1)	1985	-6.624*** (0)	1986	$I(1)$

*Notes: The numbers in parentheses are the lag order. The lag parameters are selected based on the AIC. Null Hypothesis: lreer has a unit root with a structural break in the intercept. *, ** and *** denote statistical significance at the 10%, 5% and 1% level to reject the unit root null hypothesis, respectively*

4.5 Empirical results

4.5.1 Introduction

This section presents and discusses the empirical results. In section 4.5.2, we apply a country-by-country cointegration and VECM to examine the long-run and short-run relationships between the REER and its determinants across WAMZ countries over the period 1980-2015, respectively. Further, in section 4.5.3, we derive and assess the pattern of REER misalignments using the permanent components of the REER determinants for these countries. In section 4.5.3, we impose long-run restrictions in a three-vector autoregression (VAR) model to identify economically meaningful structural shocks, i.e. oil price, productivity (supply) and demand preference- to REER determinants. We consider impulse response and variance decomposition in order to characterise asymmetries in terms of the sign, magnitude, persistence and relative contribution of the disturbances across these countries. The overarching aim is to examine whether these shocks to REER determinants differ across WAMZ countries to help inform policy decision on common monetary policy for the group.

4.5.2 Cointegration results

The study employs Johansen cointegration and VECM to analyse the long-run and the short-run relationships between the REER and the selected macroeconomic fundamentals, respectively.

In this section, we follow five general steps to achieve the aim. First, we assess the order of integration of each variable that enters the multivariate model, which can be established by unit root tests. It was established in 4.4.2 that all the variables are $I(1)$, except *rird*. The second step involves setting the appropriate lag-length and the deterministic trend in the VAR model in order to ensure that the estimated residuals are not autocorrelated. Third, estimate the rank of cointegration matrix, i.e. testing for the number of cointegration according to (Johansen 1995). The fourth step involves normalising the cointegrating vector to assess the impact of the fundamentals on REER. The

final step involves estimating and interpreting the short-run adjustment factors or speed of adjustment of the REERs and the fundamentals using VECM.

4.5.2.1 Setting the appropriate lag-length and deterministic trend

As discussed in section 4.3.1, the Johansen cointegration test can be susceptible to the optimal lag selection and deterministic components (Harris 1995). Hence setting the appropriate lag length and deterministic components in the VAR model is critical as misspecification often generates autocorrelated errors (i.e., serial correlation) (Lütkepohl 2006). Besides, Johansen (1995) cautions against overestimating the lag length as too many lags would reduce the power of the test. Increased number of lags leads to loss of a degree of freedom in a cointegrating VAR. On the other hand, Garratt et al. (2000) point out that too few lags may not capture the actual error process.

In order to address the issue of determining the appropriate lag length for the model, we conduct five different lag length selection criteria to decide the optimal lag length. These are; sequentially modified likelihood ratio (LR), final prediction error criteria (FPE), Akaike information criterion (AIC), Schwarz information criterion (SIC), and Hannan-Quinn information criterion (HQ). These tests are widely used in the literature to determine the appropriate lag length in VAR models (Enders, 2010).

Appendix 4A.2 presents the results for each criterion with a maximum lag of 3 (3 was chosen a priori bearing in mind the number of variables contained in the vector, the limited sample size and the nature of the data). Overall, we selected an optimal lag of 1 for all the countries; the lag selection was based on the lowest Schwarz information criterion (SIC). Although one lag is very restrictive even for annual data (Baffes et al. 1999), longer lag lengths leave us with very few degrees of freedom.[70]

Given that the optimal lag length has been determined, the Pantula principle of Pantula (1989) - suggested by Johansen (1992) for use to find both cointegrating rank and the correct specification of the deterministic term - is

[70] Diagnostics tests were conducted to ensure that the selected lag lengths ensure the VAR and the associated VECM model residual do not suffer from autocorrelation, non-normality, etc.

applied to identify the deterministic components for the cointegration test. The Pantula idea involves estimating three alternative models and moving from the most restricted to the least restricted model. The three models applied in this study are: (a) Model 2 - no deterministic component; (b) Model 3 - intercept but no trend; (c) Model 4 - and intercept and trend. Next, the trace test or maximum eigenvalue test statistic is compared to the critical value in each case, and the most appropriate model is deemed to be the one where the null hypothesis is not rejected for the first time (Hatemi-J 2002). Relying on the Pantula principle, the LR test results reported in Appendix 4A.3 suggest including the following deterministic components in each country's VAR model: Model 4 for Ghana, The Gambia and Nigeria, and Model 3 for Sierra Leone and Guinea should be included in the VAR model.

4.5.2.2 Johansen cointegration results

Now that we have determined that all the series involved in our analysis are $I(1)$, the optimal lag length is one and the deterministic components in the VAR system; we proceed to conduct Johansen cointegration test on the REER and the fundamentals for the five WAMZ countries.

Testing for cointegration using the Johansen method requires testing for the reduced rank or the number of cointegrating vectors (Johansen 1991; 1995). The rank of the matrix is determined by testing whether its eigenvalues are statistically different from zero. There are two test statistics to be used for this task: The trace and maximum eigenvalue tests indicate whether there is cointegration and, if so, the number of cointegrating relationships thereof.

Table 4.5 reports the trace and maximum eigenvalue test of cointegration for the five countries over the period 1980 to 2015. Based on the likelihood ratio statistics, we strongly reject the null hypothesis of no cointegration for all countries at the 5% significance level. Therefore, we conclude the existence of a long-run relationship between the REER and fundamental determinants. A detailed analysis of the cointegrating vectors is provided in the next section to assess the behaviour of the REER across WAMZ countries. The major

implication derived from both the trace and maximum eigenvalue tests is the evidence of one cointegrating relation among the variables in the system of these economies. The results support the theory of generalised purchasing-power-parity (G-PPP)[71] in WAMZ countries REERs (Enders and Hum 1994).

Table 4.5 Johansen Cointegration Statistics

	Ghana		**The Gambia**		**Nigeria**		**Sierra Leone**		**Guinea**	
	λ_{trace}	λ_{max}	λ_{trace}	λ_{max}	λ_{trace}	λ_{max}	λ_{trace}	λ_{max}	λ_{trace}	λ_{max}
Lags	**1**		**1**		**1**		**1**		**1**	
$r = 0$	107.17***	41.52***	103.07***	40.53***	119.02***	46.27***	131.75***	63.94***	82.26***	40.52***
$r = 1$	65.65	28.41	62.53	28.47	72.75	25.67	78.55	28.30	41.74	20.82
$r = 2$	37.24	19.29	34.06	20.01	47.07	19.27	48.40	24.47	20.92	10.49
No. of CE	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**

Note: *, ** and *** denote the rejection of the null hypothesis at the 10%, 5% and 1% significance level respectively. We test the existence of cointegration in the vector of variables($\ln(reer)$, $\ln(prod)$, $\ln(tot)$, $\ln(oil)$, $\ln(open)$, $\ln(gov)$ using the trace test developed by Johansen (1991; 1995).

It is worth mentioning that our initial Johansen cointegration tests with all the fundamentals in the system recorded more than one cointegrating relationship in Nigeria, Sierra Leone, and Guinea.[72] It is well established in the literature that the existence of multiple cointegrating vectors complicates the interpretation of the equilibrium relationship between the REER and its fundamental determinants and presents the problem of identification (Johansen 1992; Iimi 2006). Therefore, we addressed the above problem by omitting the $I(0)$ variable, **rird**, from the cointegrating vector, while yielding just one cointegrating relationship.[73]

[71] The G-PPP theory suggests that the fundamental economic variables determining RER are nonstationary and if the fundamentals are sufficiently integrated, as in a currency area, the real rates will share common trend.
[72] Cheung and Lai (1993) and Baffes et al. (1999) argue that the likelihood ratio test of cointegration is known to be sensitive to small-sample bias, making the properties of the trace test different from its asymptotic properties sometimes.
[73] Harris (1995) argues that for every stationary variable included in the multivariate model, the number of cointegration equations will increase correspondingly.

4.5.2.3 Interpreting the cointegrating vector

In this section, we emphasise the long-run cointegration equation derived from the 5 WAMZ countries. The argument for the discussion is that monetary union would appear more feasible when the long-run coefficients in the five equation systems have similar signs, i.e. the variables move in the same direction.

In order to interpret the cointegration results, a necessary first step is to normalise the cointegrating vector on the coefficient for the REER. The results of the normalised cointegrating vectors for the five sample countries are reported in Table 4.6. Overall, the coefficients of the estimated variables are statistically significant for the 5% level of significance. Also, the coefficients of the fundamentals- productivity differential, terms of trade, openness, government consumption, and real oil price- capture their long-run impact on the REER, but these are different across economies.

1. An increase in the relative productivity differential is associated with a real appreciation (confirming the Balassa–Samuelson effect) in Guinea and Sierra Leone. However, the estimated coefficient associated with productivity differential has an unexpected sign – negative - in the remaining three countries, suggesting that increase productivity differentials are associated with real depreciation. A plausible reason is that an increase in productivity differentials might be generated by productivity growth in the non-traded sector of these economies, which in theory has unclear effects on the prices of non-traded goods. See Edwards (1988b) for further explanation.
2. An improvement in terms of trade is associated with an appreciation of the REER in all the countries, except in Nigeria. This is in line with Chudik and Mongardini (2007) argument that since the prices of the commodities exported by developing countries (here WAMZ members) are determined in the world market, an improvement in terms of trade will positively affect the trade balance, and subsequently lead to REER appreciation.
3. An increase in the degree of openness is associated with a real depreciation in all countries, except in Guinea where the variable is

omitted in the regression due to insufficient data for the entire observation period. This suggests that increasing trade liberalisation arrangements among these countries is associated with a real depreciation of the REERs; consistent with the traditional view. Thus, an increase in the degree of openness is associated with decreasing trade barriers, imports rise more than exports, and the deterioration in the trade balance results in REER depreciation (Égert et al. 2006). This could be the result of the high degree of trade liberalisation arrangements that the countries have achieved through ECOWAS common trade policies since 1975.

4. Expansionary government consumption is associated with a real appreciation in The Gambia, Guinea, Nigeria, and Sierra Leone while the contrary, a real depreciation is observed in Ghana. The conflicting sign reported is consistent with the literature, which argues that the prediction depends on the allocation of government consumption expenditure to tradable and non-tradable goods. However, for the case that actual data on government expenditure on non-tradable are minimal and are almost non-existent in many developing countries, the real sign of this proxy can be either positive or negative (Edwards 1988b; Elbadawi 1994; Elbadawi and Soto 2005; Ricci et al. 2013).
5. Finally, an adverse real oil price is associated with real depreciation in Ghana and The Gambia. This is not surprising considering that these countries are oil-importing countries where world oil prices are denominated in foreign currencies. Hence, an increase in the real oil price will lead to a decrease in terms of trade and subsequently depreciate REER. On the other hand, an increase in real oil price is associated with a real appreciation in Nigeria, Sierra Leone, and Guinea. The positive estimated coefficient for real oil price in Nigeria is expected, is a major oil-exporting economy, whereas the real oil price is found to have the unexpected positive sign for Sierra Leone, and Guinea.

In a nutshell, the following observations can be made based on the above cointegrating results: First, overall, productivity differential, terms of trade, openness, government consumption, and the real oil price are found to be

important in the REER determination in the long run. However, the results show cross-country variations in the impacts of those variables on the REER, suggesting a lack of macroeconomic policy coordination. However, Beirne (2010) argues that given differing business cycles, trade, and consumption patterns across developing countries, it is not feasible that all the coefficients will move in the same direction. Nonetheless, this reiterates the need for further policy coordination within the group. Second, it is worth mentioning that although the BEER methodology defines the existence of a long-run relationship between the REER and its determinants, it is not always possible that the REER may be in equilibrium at every point in the long run. This is due to possible imperfections, rigidities or regulations; however, equilibrium may be achieved gradually in the long-run. For that reason, the short-run adjustment factor is estimated in Section 4.5.2.4 to complement the long-run equilibrium model in the empirical analysis.

Table 4.6 Results of Cointegration Estimation

Ghana	$\ln(reer_t) = -7.102\ln(prod) + 0.709\ln(tot) - 3.470\ln(open) - 0.860\ln(gov) - 3.195\ln(oil) + 1.055trend + 28.09$ $[-5.531]\quad [3.179]\quad [-10.967]\quad [-2.426]\quad [-11.674]\quad [10.923]$
The Gambia	$\ln(reer_t) = -2.870\ln(prod) + 0.065\ln(tot) - 0.440\ln(open) + 0.278\ln(gov) - 0.195\ln(oil) - 0.099trend + 17.397$ $[-6.580]\quad [4.694]\quad [-7.267]\quad [5.668]\quad [-4.604]\quad [-5.827]$
Guinea	$\ln(reer_t) = 0.619\ln(prod) + 0.579\ln(tot) + 0.353\ln(gov) + 0.141\ln(oil) - 0.0542$ $[2.162]\quad [4.714]\quad [5.271]\quad [5.739]$
Nigeria	$\ln(reer_t) = -0.866\ln(prod) - 0.5\ln(tot) + 0.726\ln(gov) - 1.170\ln(open) + 1.871\ln(oil) - 0.462trend + 9.76$ $[-2.102]\quad [-2.514]\quad [5.645]\quad [-7.804]\quad [7.054]\quad [-7.322]$
Sierra Leone	$\ln(reer_t) = 7.753\ln(prod) + 2.379\ln(tot) + 2.342\ln(gov) - 2.167\ln(open) + 0.617\ln(oil) - 12.944$ $[9.836]\quad [6.811]\quad [4.607]\quad [-8.715]\quad [7.793]$

Note: [ ] t-statistics

4.5.2.4 Short-run adjustment factor

Next, we turn to the short-run adjustment factors or speed of adjustment of the REERs and the fundamentals. Though we base most of our interpretation of the impulse response in the subsequent section, we comment on some of the short-run adjustment coefficient estimates first. Our estimated equation, Eq. (3) suggests that when the estimated $\boldsymbol{\alpha}$ coefficient is negative and significant, then deviations from the cointegrating relationship[74] can be corrected through the adjustment of the REER. Therefore, we further explore whether the REER in WAMZ countries responds significantly to past deviations.

To ensure confidence in the VECM estimation, we examine whether the variables are weakly exogenous in the system since some of the variables in the cointegrating matrix are in differentials (differences between domestic and foreign variables) (Harris 1995; Hendry 1995). We conduct formal tests that the relative terms of trade, productivity differentials and real oil price are weakly exogenous. The null hypothesis of zero restrictions weakly exogenous cannot be rejected in most cases for these variables. See Appendix 4A.4 for the test results.

Also, we can assume a priori that relative terms of trade and world oil price as weakly exogenous. The reason is that these countries are small open economies and can be accepted as price-takers in international trade, i.e., they have no or little influence on the price of their exports or imports (Harris 1995; Opoku-Afari et al. 2004). Further, the study conducted the VEC Residual Serial Correlation LM Tests; VEC Residual Normality Tests; VEC Residual Heteroscedasticity Tests; inverse AR root test to ensure the VECM is stable and do not suffer from autocorrelation, non-normality, heteroscedasticity, and non-stationarity. The inverse AR root tests for all the countries suggest a stable (stationary) VECM. Diagnostic test results are provided in appendix 4A.5.

The estimated short-run adjustment coefficients and the associated t-ratios are presented in Table 4.7. The adjustment coefficients shed light on the dynamics of the adjustment process towards equilibrium. In the event of any deviation

[74] The Engle and Granger (1987) representation theorem asserts that the existence of an error-correction representation depends on the existence of cointegration.

from the long-run equilibrium, these variables jointly respond and adjust the system back to equilibrium. The REER adjustment factor Dln(reer), is negative and statistically significant, as expected from theory for all the countries, except The Gambia and Sierra Leone. Besides, a similar speed of adjustment across these countries would imply that the countries REER respond symmetrically to shocks. However, the speed of adjustment Dln(reer) or (α) slightly varies across the countries, with coefficients ranging from 0.94 in Guinea, 0.81 in Nigeria, to 0.53 in Ghana. For instance, an adjustment coefficient of 0.94 suggests that about 94% of any misalignment between the actual and equilibrium REER is corrected within a year. This show less persistent adjustment dynamics in Guinea's REER relative to the remaining countries. We deduce that the other countries with low REER adjustment speed, e.g., Ghana, could be due to limited nominal exchange rate flexibility. The above adjustment factors corresponding to a half-life of the REER of 0.7 years for Guinea, 0.9 years for Nigeria, and 1.3 years for Ghana. The implication is that the REER returns to equilibrium within the above listed period if it meanders from its equilibrium path. The adjustment speed for Ghana is comparable to that of Asongu (2014), who finds the half-life of 1 year for the REER, but the remaining countries coefficients were insignificant. On the other hand, the short-run effects of the fundamentals are generally insignificant across the various specifications apart from the real oil price equation in Ghana and Guinea; productivity differentials, openness and government consumption in The Gambia. These variables contribute to REER realignment.

Table 4.7 Estimated adjustment coefficients in VECM

	Ghana	**The Gambia**	**Guinea**	**Nigeria**	**Sierra Leone**
$Dln(reer)$ (α)	**-0.529*** [-2.040]**	-0.245 [-1.126]	**-0.941** [-1.758]**	**-0.807*** [-3.418]**	-0.003 [-0.043]
$Dln(prod)$	0.029 [2.986]	**-0.256*** [-2.941]**	0.122 [1.436]	0.0160 [0.300]	0.138 [3.962]
$Dln(tot)$	0.076 [0.474]	3.075 [1.587]	0.590 [1.232]	-0.248 [-1.082]	-0.004 [-0.080]
$Dln(oil)$	**-0.318*** [-2.349]**	1.292 [1.602]	**-2.321*** [-1.790]**	-0.414 [-1.318]	-0.014 [-0.094]
$Dln(open)$	-0.002 [-0.040]	**-1.335*** [-2.932]**	-	-0.201 [-0.797]	-0.029 [-0.214]
$Dln(gov)$	-0.050 [-0.560]	**-1.216*** [-2.315]**	0.825 [1.257]	-0.278 [-1.170]	0.108 [1.448]
Half-life of deviation from ERER in years	1.3	-	0.7	0.9	-

Notes: *, ** and *** denote the rejection of the null hypothesis at the 10%, 5% and 1% significance level respectively. [ ] T-statistics

4.5.3 REER misalignment

Figure 4.3 plots the observed REER misalignments of WAMZ countries. In this section, we investigate whether the REERs of WAMZ countries experienced an excessive deviation from their equilibrium path or whether there is a tendency of convergence towards the equilibrium path. For this purpose, we compute the equilibrium REER using the cointegrating parameters. One could assume that the actual values correspond to long-term values. However, Clark and MacDonald (1999) argue that actual values are subject to seasonal or cyclical fluctuations and hence economic series are unlikely to be in equilibrium always. Therefore, we smooth out each fundamental variable into its permanent and transitory components, excluding speculative and cyclical factors using the Hodrick and Prescott (1997) (H-P) filter.[75] This helps us obtain the 'permanent' components of the fundamentals, taken to be measures of sustainable levels of the fundamentals. These values are substituted into the estimated cointegrating vector that links the REER and fundamentals and provides us with the estimated equilibrium REER. This would enable the computation of REER misalignment[76] as the deviation of the actual REER ($\boldsymbol{q_t}$) from the equilibrium ($\boldsymbol{\tilde{q}_t}$) REER as stated by equation 4:

$$(logq_t - log\tilde{q}_t) * 100 \qquad 4$$

where positive values indicate REER undervaluation and negative ones REER over-valuation (Clark and MacDonald 1998).

A visual inspection indicates signs of possible substantial divergences of the REERs from their equilibrium path. This suggests that the REERs for most countries follow paths that are out of line with fundamentals or misaligned. The indication is that changes in the fundamentals may have differentiated impacts on the REER across the countries or perhaps indicating problems of exchange

[75] The Hodrick and Prescott (HP) filter smoothing technique is chosen for this research due to the following advantages; it is the widely and efficiently used in the BEER literature, it is flexible and easier to implement and produces a more accurate approximation to the optimal filter (Egert et al., 2006). Although researchers have not agreed on the best procedure to filter out the permanent component of the fundamentals, a variety of smoothing techniques or trend-cycle decomposition methods have been used in the literature: moving averages or centered-moving averages; the trend-cycle decomposition methods also include: Beveridge and Nelson (1981) decomposition method, Hodrick-Prescott (HP) filter by Hodrick and Prescott (1997, band-pass filter (Baxter and King 1999).

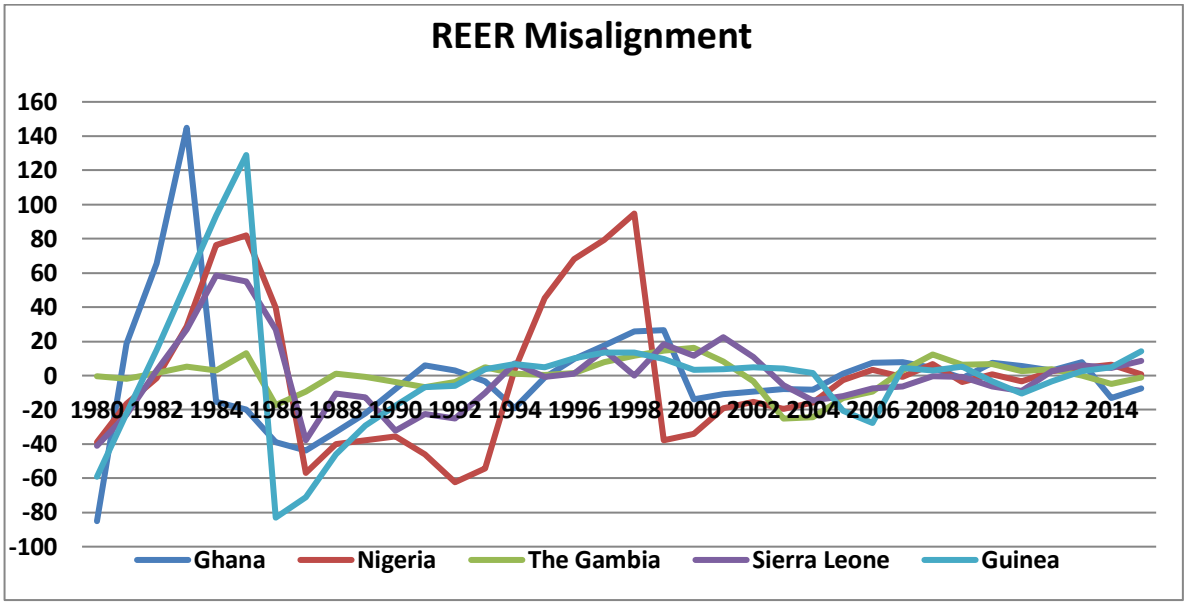
[76] Total REER misalignment at any point in time can be decomposed into the effects of transitory factors that have a short-run effect on the exchange rate, random disturbances and the extent of the deviations of the macroeconomic fundamentals from their long-run (or equilibrium) values (MacDonald 1998).

rate management. Figure 4.3 shows that before 2000- the base year- there is a clear episode of real overvaluation and undervaluation in all the countries' REERs. Nevertheless, considering the influence of different historical, economic and political traditions such as the major exchange rate policy changes undertaken by these countries as part of the economic reforms supervised by the IMF and World Bank in the 1980s and political instability, the degree of misalignments could be argued 'natural' for the region. For instance, the sharp deviation between 1993-1998 in Nigeria is consistent with the political instability the country underwent during Abacha's military regime. Moreover, Nigeria remained an outlier for most of the period before 2000, probably due to its influence as the biggest economy in GDP and population amongst the group.

Interestingly, the relative misalignments appear to have declined since 2007 as the individual members' REER trend towards the common equilibrium path. This somewhat concurs with Coulibaly and Gnimassoun (2013) report that the dispersion of misalignments in the WAMZ area has relatively diminished since 2000, reflecting a convergence between competitiveness levels of its member countries. In other words, these countries have not gone through any excessive real devaluation since 2007. Perhaps, we can argue that they rely more on interest rate tools for a macroeconomic adjustment instead of nominal exchange rate adjustments.

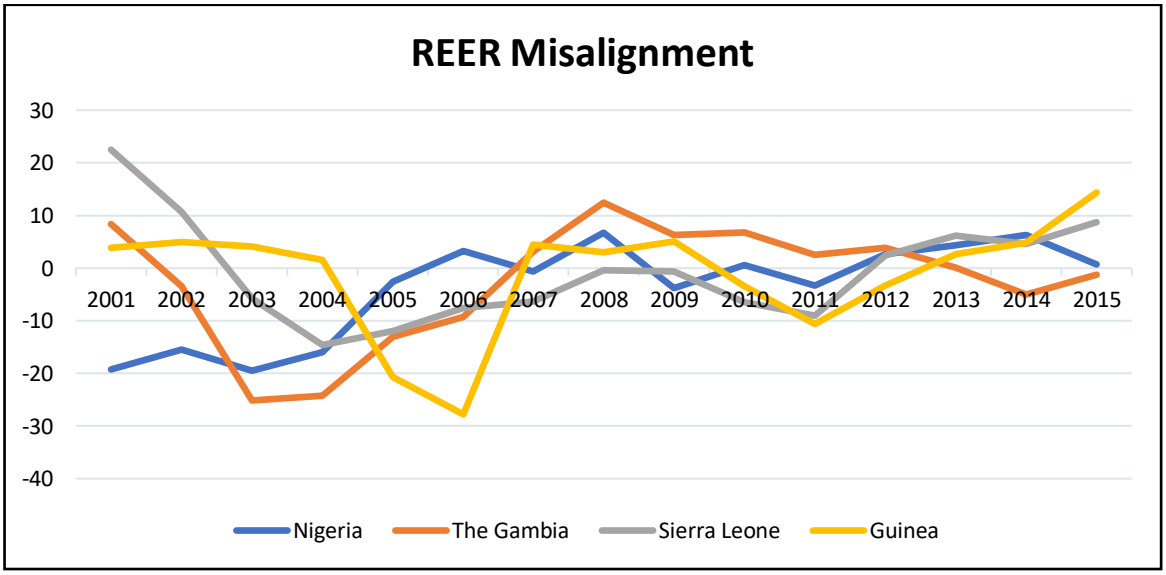
Notwithstanding, more attempts are required to eliminate total misalignments amongst members and bring the REER in all countries closer to equilibrium. The total misalignments are clear after redoing the graph for the period 2000-2015, shown in figure 4.4. Though a few of WAMZ countries REER have deviated from their long-term path over the period, it is showed that most achieved some stability within -/+10% band after 2007. Moving forward, sound macroeconomic policies and stable external factors could bring the REER in line with its fundamentals (Edwards 1988a; Isard and Faruqee 1998; Gulde and Tsangarides 2008; Chowdhury 2012). Therefore, as indicated in previous studies (Debrun et al. 2005; Fielding and Shields 2005; Alagidede et al. 2008) a monetary union in WAMZ inevitably depends on how well the authorities achieve macroeconomic integration before upscaling to a full monetary union.

Figure 4.3 REER Misalignment (1980-2015)



Source: Author (2018)

Figure 4.4 REER Misalignment (2000-2015)



Source: Author (2018)

4.5.4 Measuring shock asymmetry: Shock identification strategy

Building on the empirical model outlined in Section 4.3.1 our interest in this section is to examine the real effective exchange rate (REER) responses to shocks in exchange rate determinants across the WAMZ economies; and whether disturbances are distributed symmetrically across the countries. Based on the analysis in section 4.5.2, we consider three shocks representing both external and domestics - oil price (common external), supply (productivity) and demand preference shocks - that could be an important driver of REER fluctuations in the area.

In this paper, a persistent change in world oil prices with a persistent effect on the WAMZ country's REER would be captured like a common external shock (Forbes et al. 2015). These economies are closely integrated into the broader global economy with their heavy reliance on export of primary commodities; global or external developments affect the economic fortune of these countries. Consequently, the prevalence of external shocks may justify common monetary policy for the countries (Zhao and Kim 2009). A rise in world oil price will worsen the balance of trade position of a net oil-importing country, subsequently lead to a real depreciation of the REER (Zhou 1995; Chen and Chen 2007). An increase in domestic productivity would be captured as a domestic supply shock or productivity shock. A supply disturbance is identified as a shock such as improvements in technology, that causes productivity shock in traded sectors relative to nontraded sectors. This type of productivity shock is central to the Balassa-Samuelson hypothesis. Productivity shocks in countries with higher productivity in the tradable sector typically result in permanent REER appreciation (Balassa 1964; Samuelson 1964; Edwards 1989).

Furthermore, changes in the REER is referred to here as real aggregate demand shocks not related to money, such as preference or fiscal shocks (Rogers 1999; Craighead and Tien 2015). An increase in the real demand shocks such as the propensity to consume would result in higher prices and an appreciating REER in the long run (Alexius and Post 2008). The domestic or country-specific shocks are shocks that only affect a particular WAMZ member economy due to a change in domestic policy or a change in productivity.

To identify asymmetric macroeconomic shocks, we estimate a three-variable VAR in first differences and assume that $X = [\Delta(oil_t), \Delta(prod_t), \Delta(reer_t)]$- change in the logarithm of the real oil price (oil_t), the logarithm of the productivity differential $(prod_t)$ and changes in the logarithm of the real effective exchange rate $(reer_t)$ - are related to three uncorrelated structural innovations to be determined, $\varepsilon_t = [\ {\varepsilon_t}^o,\ {\varepsilon_t}^s,\ {\varepsilon_t}^d]$.Where $({\varepsilon_t}^o)$, $({\varepsilon_t}^s)$ and $({\varepsilon_t}^d)$ are defined as real oil price, supply (productivity) and demand shocks, respectively. The structural shocks are unobserved. Hence we estimate a reduced form $VAR(p)$ with a lag length (p) chosen such that the residuals approximate white noise by imposing appropriate identifying restrictions on A_0^{-1}. Under the appropriate restrictions, structural shocks can be recovered from the estimated reduced form errors by using the following relationship:

$$e_t = A_0^{-1}\varepsilon_t \qquad 5$$

Where e_t denotes the reduced-form errors. To derive three types of structural shocks: oil price $({\varepsilon_t}^o)$, supply $({\varepsilon_t}^s)$ and demand $({\varepsilon_t}^d)$, we need nine constricted conditions for the model, including three endogenous variables. The orthogonality of the structural shocks (unit variance $Var(\varepsilon_t) = I$) identifying assumption provides six restrictions to identify matrix A_0^{-1}. The other identifying assumptions are the long-run restrictions, which gives as the following recursive structure of the model:

$$e_t \equiv \begin{bmatrix} \Delta(oil_t) \\ \Delta(prod_t) \\ \Delta(reer_t) \end{bmatrix} = \begin{bmatrix} a_{11i} & 0 & 0 \\ a_{21i} & a_{22i} & 0 \\ a_{31i} & a_{32i} & a_{33i} \end{bmatrix} \begin{bmatrix} {\varepsilon_t}^o \\ {\varepsilon_t}^s \\ {\varepsilon_t}^d \end{bmatrix}$$

The lower triangularity of the model can be justified as follows: (1) WAMZ country-specific shocks do not have a contemporaneous effect on the world oil price. This restriction is necessary to identify domestic shocks and holds for small open economies, such as the countries under investigation. The assumption that small open economies cannot affect the rest of the world is commonly employed in the literature (Zhao and Kim 2009; Carrière-Swallow and Céspedes 2013; Forbes et al. 2015).[77] (2) In the long run, productivity is

[77] The key assumption for the purposes of estimation and inference is that global variables are weakly exogenous, compatible with a limited degree of weak dependence across idiosyncratic shocks. To satisfy this property, we assume

only affected by supply-side shocks ($\varepsilon_t{}^s$), such as technology shock (Blanchard and Quah 1989), while the real exchange rate can be affected by both supply and demand-side factors (Craighead and Tien 2015).

It is worth noting that whereas the three structural innovations may mix various underlying shocks, our focus is on whether commonalities exist in WAMZ country's REER after the three structural shocks and how significant they are proportional to each other.

4.5.4.1 Impulse response analysis

We compute impulse response functions to determine the behaviour of shocks to the exchange rate fundamentals across WAMZ countries. The same data used in the VECM analysis is used for the impulse responses. We mainly focus on the responses of the real effective exchange rate to three structural innovations- oil price, productivity and demand preference shocks. The prevalence of structural shocks may justify common monetary policy for the group; especially the oil price (external) shock. A shock is symmetric if the sign, magnitude, and persistence of the responses do not vary significantly across countries, otherwise, it is considered as asymmetric (Bayoumi and Eichengreen 1992; Ballabriga et al. 1999). In estimating the three-VAR model, the number of lags is set to one, since the Schwarz Information Criterion (SIC) indicated that all the models had an optimal lag length of either one or two. We chose a uniform lag of one to preserve the symmetry of the specification across countries.

Figure 4.4 reports the cumulative impulse responses of real exchange rate movements to the one-standard-deviation oil price, supply (productivity) and demand shocks over fifteen years in each country. The use of accumulated responses helps to aid interpretation. The dynamic effect of each structural innovation is reported with a standard deviation band around the point estimate. Recall that the exchange rate is defined so that an increase in the value of the real exchange rate appreciates the real value of the domestic currency. Initial

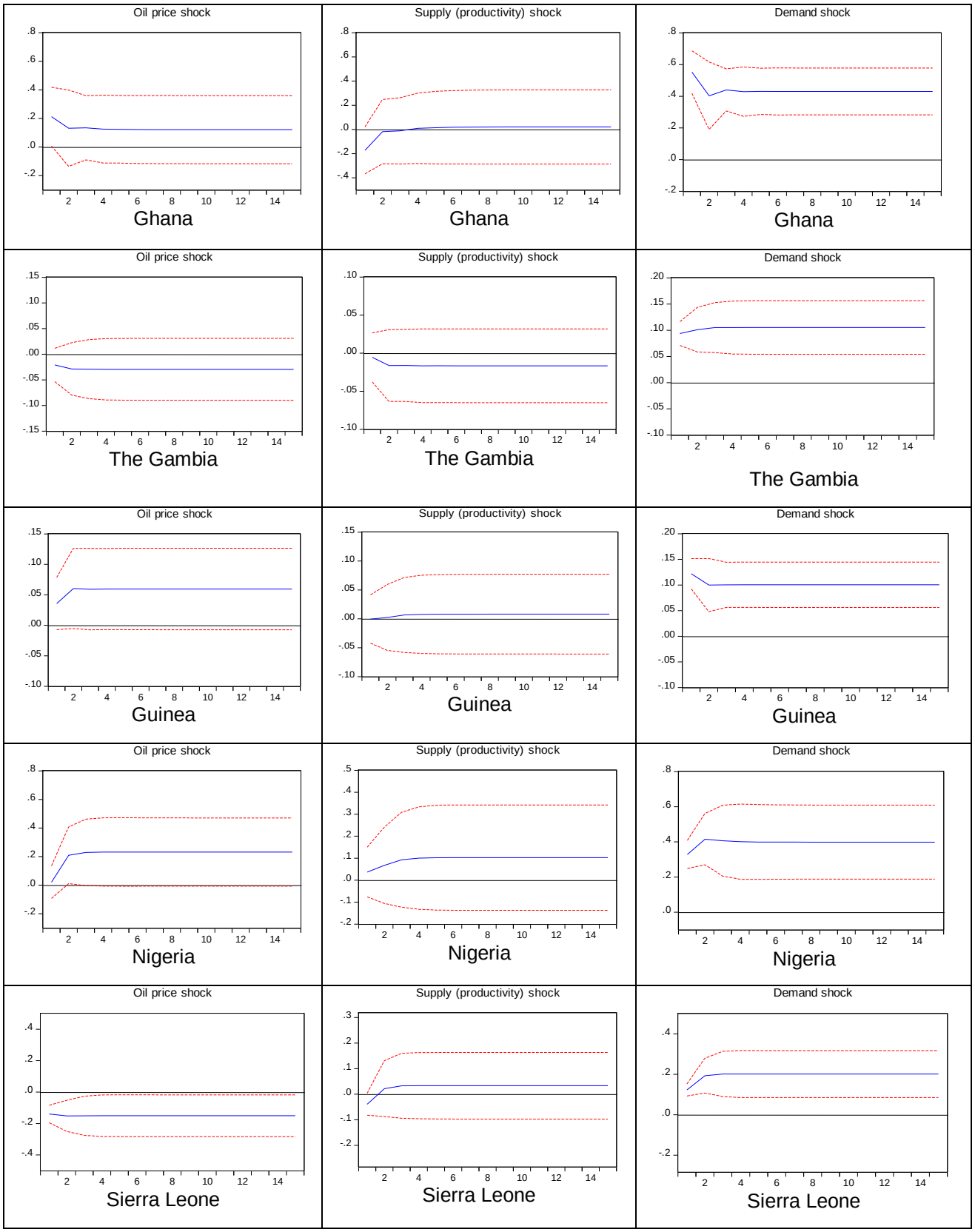
that all economies in the model are small to the world economy, which is reasonable given that our country group consists of developing countries (Dumrongrittikul and Anderson 2016).

observation of Figure 4.4 shows that the response of the REER to the three structural shocks differ across countries and the shock is felt immediately in all countries; it peaks about two to three years later. In The Gambia and Sierra Leone, an adverse oil price shock (increase in the real price of oil) depreciates the REER within the first two to three years, after which we observe a permanent depreciation of the REER. In contrast, an increase in the real price of oil permanently appreciates the REER in Guinea, Nigeria, and Ghana. The result is not surprising for Nigeria, being a major oil-exporting country.

Furthermore, a supply shock (productivity improvement) permanently tends to lead to an appreciation of the REER in Guinea, Nigeria and Sierra Leone. This corresponds with the traditional Balassa-Samuelson view. In contrast, The Gambia REER depreciates permanently after a supply shock. In Ghana, supply shock has an initial depreciating effect on REER but after that dies out. Though the contrasting findings could reflect the different economic experience and structure of the WAMZ members, the impact of productivity shock also depends on the transmission mechanism. Thus, whether through the REER is based on tradable prices or through relative prices between tradable and nontradable (Wang et al. 2013). Besides, a demand shock has a permanent appreciating effect on the REER in all countries, though the immediate impact of a one-unit demand shock varies across countries.

Overall, the impulse response analysis indicates that there are notable differences in the results. The response of the REER to the oil price, supply (productivity) and demand shocks across the five countries are asymmetric. These findings somewhat concur with Buigut and Valev (2005) for East African countries, and Houssa (2008) for WAEMU countries. The indication is that response to the common monetary policy after a shock would vary across the WAMZ countries; hence, the costs of WAMZ members losing monetary autonomy will be much higher in a world where a monetary response to a shock is immediate.

Figure 4.5 Cumulated impulse responses of real effective exchange rates to one standard deviation structural innovations.



Notes: Solid lines are point estimates, and dash lines represent approximate standard errors, computed by Monte Carlo simulations, using 1000 replications.

4.5.4.2 Forecast error variance decomposition analysis

The variance decomposition has been applied to identify the relative contribution of the three structural shocks on REER fluctuations across the countries. The aim is to investigate whether the sources of variation in the REER are shared across the countries. Table 4.8 reports results of the variance decomposition for each of the five sampled country's REER at the one and ten-year forecast horizons (Variance decompositions are reported only for the REER). One (ten) year responses are taken as short-term (long-term) effects.

The principal contributors of the REER are different across economies, shown in Table 4.8. In the short run, REER fluctuations are driven mostly by country-specific preference demand shocks; explaining over 80 percent of the variability the first year across The Gambia, Ghana, Guinea, and Nigeria. The relative contribution of demand preference shocks declines gradually afterwards, but none less than 70 percent. However, the findings are different in Sierra Leone; demand shocks contribute to about 42 and 45 percent of REER fluctuations in the short and long run, respectively. The dominance of domestic demand shocks in REER fluctuations concurs with those found in Hoffmaister et al. (1998) for non-CFA countries.

Also, we find significant differences in the relative importance of supply (productivity) shocks on REER fluctuations. In the short run, supply shock contribution is less than 8 percent across the five countries; and is almost irrelevant to the REER variability- less than 1 percent- in The Gambia and Guinea. The pattern is almost the same in the long run in The Gambia, Guinea, and Nigeria, where supply shocks explain no more than 3 percent of REER variability. In Ghana and Sierra Leone, the contribution of supply shock to REER movements rises to 13 and 12 percent in the long run, respectively. In contrast, Harvey and Cushing (2015) reported the dominance of supply shocks on the variability in output growth, explaining at least 99 percent for Gambia, Ghana, and Nigeria.

Furthermore, the relative importance of oil price (external) shock to REER dynamics is 54, 12, 8, 5 and 3 percent in Sierra Leone, Ghana, Guinea, Gambia, and Nigeria in the short run, respectively. In the long run, the pattern is

almost the same in Ghana and The Gambia; marginally rises to 11 percent in Guinea; substantially rises to 20 percent in Nigeria; and declines to 44 percent in Sierra Leone. The result is not surprising, especially for Nigeria, because of the country's heavy dependence on exports of crude oil; whereas the other countries are oil-importing, exposing these countries to trade and exchange rate fluctuations. Hoffmaister et al. (1998) on the other hand, reported the absence of the role of external shocks in explaining real exchange rate movements in the non-CFA countries; though the authors used world interest rate and terms of trade shocks as a proxy for external shocks.

Overall, the sources of REER variability are idiosyncratic, and they vary significantly across countries. Appendix 4A.6 also show similar asymmetric shocks across WAMZ after we replaced oil price shock with terms of trade shock as a common external shock to these countries. The structure and the different economic experience of these economies could contribute to the contrasting importance of the structural shocks on the REER. This result somewhat reinforces the early findings that structural shocks are more asymmetric among WAMZ countries. Therefore, these countries will find it difficult to adjust to either common external, supply or demand shocks if they form a monetary union.

Table 4.8 Variance decomposition

Horizon	Demand shock	Supply shock	Oil price shock	Demand shock	Supply shock	Oil price shock
	(%)	(%)	(%)	(%)	(%)	(%)
Ghana				Gambia		
1	80.25	7.84	11.91	94.91	0.33	4.76
2	75.60	12.43	11.98	93.20	1.53	5.27
3	75.66	12.40	11.94	93.21	1.52	5.27
4	75.58	12.48	11.94	93.20	1.53	5.27
5	75.57	12.49	11.94	93.20	1.53	5.27
10	75.57	12.49	11.94	93.20	1.53	5.27
Guinea				Nigeria		
1	92.11	0.01	7.89	95.00	2.33	2.67
2	89.03	0.05	10.93	78.44	2.03	19.52
3	88.93	0.15	10.92	77.90	2.39	19.72
4	88.92	0.16	10.92	77.86	2.42	19.72
5	88.92	0.16	10.92	77.86	2.42	19.72
10	88.92	0.16	10.92	77.86	2.42	19.72
Sierra Leone						
1	41.74	4.25	54.01			
2	44.61	11.71	43.69			
3	44.57	11.93	43.50			
4	44.57	11.93	43.50			
5	44.57	11.93	43.50			
10	44.57	11.93	43.50			

4.6 Chapter summary

One fundamental precondition that determines the ability to conduct monetary policy smoothly in a monetary union is the symmetry of response to common policy across different countries. This chapter focuses on one of the main issues in the debate on the monetary union in the WAMZ, whether shocks that contribute to macroeconomic fluctuations are symmetric or not across these countries. Consequently, we assess the behaviour of REERs across these countries to characterise macroeconomic asymmetry. The analysis is conducted twofold:

First, the chapter estimates the short-run and long-run effects of macroeconomic fundamentals on REERs to assess the behaviour of REERs across these countries using country-by-country VECM. Chapter 4 further derives the equilibrium REER and misalignments for these countries to examine whether they are converging over time towards the equilibrium. Overall, productivity differentials, terms of trade, real oil price, government consumption and trade openness are found to be important determinants of the REER in the long run in WAMZ. However, the significant impact of the common fundamentals on REER is different across economies. Also, the country-specific VECM results show that the existence of REER means reversion in 3 countries, but the speed of adjustment varies across candidate countries. Furthermore, the computed REER misalignments suggest that before 2007 the REER of WAMZ members experienced high divergence from equilibrium path. The degree of REER misalignments appears to diminish, converging towards equilibrium between 2007-2015.

Second, the chapter identifies three types of shocks- oil price, productivity (supply) and demand preference shocks- from exchange rate determinants using the structural autoregressive model (SVAR) and assess how REERs respond to these shocks to characterise asymmetry across WAMZ. From the impulse response analysis, there appear to be marked differences in the effects of oil price (external) shock among the WAMZ countries REER. Whereas real oil price shock leads to a real permanent appreciation in Nigeria, Guinea and Ghana, the contrary is observed in The Gambia and Sierra Leone. The

response of REER to supply (productivity) shock across the five countries are also asymmetric. Though the response of REER to domestic aggregate demand shocks are positive for all countries, they differ in size and speed, indicating idiosyncratic aggregate demand shock. In the case of the variance decomposition, the sources of REER variability are idiosyncratic, and they vary significantly across countries.

The overall evidence from the empirical investigation points to heterogeneous economies. The structure and the different economic experience of these economies could contribute to the structural differences. The findings imply that, in the absence of an alternative adjustment mechanism (such as fiscal transfer schemes), a move towards monetary union will be associated with a high cost to the countries in a world where a monetary response to a shock is immediate. Idiosyncratic shocks imply the need for different policy responses to adjust to macroeconomic shocks. This strengthens the case for policy autonomy in the region and is consistent with previous studies showing considerable economic divergences amongst WAMZ countries as the primary constraint to monetary union.

Chapter 5 Currency union and intraregional trade in ECOWAS: lessons for the future

5.1 Introduction

According to the classical OCA literature discussed in chapter 2, participating in a monetary union is associated with the loss of member's autonomy over national monetary policy instruments to stabilise country-specific macroeconomic shocks (Mundell 1961). However, the new OCA literature argues that the degree of the cost depends importantly on the nature of shocks to which the participating countries in a currency area are subjected (Tavlas 1994), thereby the focus should be on the potential benefits. These are: first, joining a monetary union is accompanied by the adoption of a more efficient and credible monetary practice[78] (Barro and Gordon 1983; Giavazzi and Giovannini 1989; Beetsma and Giuliodori 2010).

Second, by eliminating exchange rate risks and transaction costs, a common currency can spur trade and business cycle synchronisation (Frankel and Rose 1998; Rose 2000; Frankel and Rose 2002; Baldwin et al. 2008; Tavlas 2009).[79] ECOWAS sees the possibility of a broader monetary union as a logical way to boost intra-regional trade and growth in the sub-region, an objective stipulated in article 3 of the 1993 revised treaty.[80] Such benefits could reasonably be expected to improve welfare (Fielding and Shields 2005; Clerc et al. 2011).

In this chapter, we focus on the existing currency union, the CFA franc zone in ECOWAS, and estimate its effect on bilateral trade over the period 1980-2016. We assess whether the CFA franc zone trade effect provides a strong case for the WAMZ (ECOWAS) single currency arrangement. Unlike earlier studies

[78] A country that suffers from an inflation bias and lacks credibility (Barro and Gordon 1983), can reach a low inflation reputation overnight by surrendering itself to the control of the low inflationary central (supranational central bank) (Giavazzi and Giovannini 1989). Beetsma and Giuliodori (2010) suggest that the incentive for the central bank to relax monetary policy is particularly strong when the central bank is under the influence of a government that wants to reduce unemployment. However, this is beyond the scope of this thesis.

[79] De Grauwe (2018) further indicates that a currency union instigates greater financial integration, which in turn reduces the cost of trading and therefore facilitates stronger trade.

[80] The fifth meeting of the Presidential Task Force on the ECOWAS Single Currency Programme was held on 21st February 2018 in Accra, Ghana. The Task Force comprises leaders of the 15 ECOWAS member countries reaffirmed their political will to meet the ECOWAS Single Currency Programme deadline by 2020 (Final communique- http://www.wami-imao.org/).

(Anyanwu 2003; Carrère 2004; Nitsch 2004; Ajayi 2005; Fielding and Shields 2005; Masson and Pattillo 2005; Hulej et al. 2006; Masson 2008; Zannou 2010; Adam and Chaudhry 2014), we estimate a panel gravity specification, allowing for country-pair and year-fixed effects on a comprehensive data set of bilateral trade flows of the 15 ECOWAS member countries. Our approach offers two main advantages: First, it allows country-pair fixed-effects to mitigate the risk of omitted-variable bias from any possible endogeneity issues.[81] The country-pair dummies control for heterogeneity since they account for any unobserved or misspecified characteristics of each pair of countries that simultaneously explain trade volumes between them (Cheng and Wall 2005; Baldwin and Taglioni 2007; Berger and Nitsch 2008; Head and Mayer 2014). Second, unlike the cross-sectional approach, the panel fixed effects estimator exploits the time-series variation around country-pair averages to provide insight about the actual trade effects of a currency union (CFA franc in the current study) (Glick and Rose 2016; Glick 2017). We also estimate the gravity equation by controlling for zero-trade values by adding a constant of one to each trade value to utilise the full sample, including zero trade flows in a log-linear estimation.

Furthermore, we consider not only whether the CFA franc trade effect is positive or not, but also, whether the increase was mainly a trade diversion or a trade creation. Finally, we check the robustness of our results using a Poisson pseudo-maximum-likelihood (PPML) technique. Silva and Tenreyro (2006) pointed out that in the presence of heteroscedasticity and zero trade values; the PPML delivers consistent estimates better than OLS log-linear specification.

The chapter is organised as follows: Section 5.2 provides a literature review of the impact of monetary unions on trade. Section 5.3 discusses the methodology employed to assess the impact of a single currency on bilateral trade and the data. Section 5.4 discusses the empirical results of the effect of the CFA franc zone on bilateral trade. The final section 5.5 provides conclusion.

[81] We assumed that endogeneity is less of a problem in the case CFA franc zone (for historical reasons) and monetary union membership is exogenous to economic characteristics. See section 3.1 for a detail discussion.

5.2 Review of the effects of monetary unions on trade

This section is related to two strands of the literature. The first strand of research assesses the impact of exchange rate variability or fluctuations on trade (Frankel and Rose 2002; Auboin and Ruta 2013). In West Africa, the non-WAEMU states have separate national currencies. The argument against floating currencies is that exchange rate changes create uncertainty that discourages trade flows (Mundell 1961). However, the empirical evidence in the literature is mixed (Frankel and Wei 1993). One reason that economists and policymakers give is the possibility for of hedging through derivatives against exchange rate risk (Frankel and Rose 2002; Chen and Novy 2017). It is worth noting that hedging instruments are limited in West Africa due to the underdeveloped financial sector. Besides, Frankel and Rose (2002) argue that most of the early studies estimate the relationship between exchange rate variability and trade employing time series data, making it challenging to generate the exact effect of exchange rate changes on trade.

The second strand explores whether by eliminating exchange rate uncertainty, membership of currency unions promotes trade flows among members. In earlier work, Rose (2000) using a gravity equation on a data of bilateral trade among 186 countries reported that trade triples for two countries that use a common currency as compared with two countries using different currencies. The reasoning is that permanent commitment to a fixed exchange rate eliminates the uncertainty and transaction costs associated with exchange rate variability of trading across borders[82] (Frankel and Rose 2002; Auboin and Ruta 2013). In effect, lower transaction costs and increased competition (via a pro-competitive effect) lowers the relative price of traded goods coming from the union (Baldwin et al. 2008).

Other subsequent works (Rose and van Wincoop 2001; Frankel and Rose 2002; Glick and Rose 2002) also found that a common currency doubles bilateral trade among members. After that, a significant research effort was

[82] Uncertainty about future exchange rates directly translates into uncertainty about future receipts in domestic currency (Auboin and Ruta, 2013). However, the potential loss depends on the extent to which countries in the union face asymmetric shocks, and whether countries in the region are sufficiently flexible to absorb or mitigate such shocks, with factor mobility and transfers acting as shock absorbers (Hulej et al. 2006).

devoted using a counterfactual gravity model to assess the trade effect ex-ante and ex-post European Monetary Union (EMU). However, few papers have considered the trade impact of a common currency within ECOWAS, though the CFA franc zone has existed for over half a century. These sparse studies (Anyanwu 2003; Carrère 2004; Nitsch 2004; Ajayi 2005; Fielding and Shields 2005; Masson and Pattillo 2005; Hulej et al. 2006; Masson 2008; Zannou 2010; Adam and Chaudhry 2014) differ in their empirical methodology, country of coverage, and time span, yet they report evidence that a common currency can increase bilateral trade in ECOWAS.

There has been some criticism of earlier empirical studies utilising the often-preferred lognormal gravity equation with OLS for providing implausibly large currency union effects due to treatment effects (Persson 2001).[83] These include the potential endogeneity of monetary union membership, omitted policy (unobserved) variables, zero-valued trade flows, among others (Persson 2001; Melitz 2004; Baldwin 2006b; Burger et al. 2009). Potential endogeneity problems can hide the real effect of a currency union on trade (Alesina and Barro 2002; Tenreyro and Barro 2003). In ECOWAS, unofficial trade barriers such as numerous roadblocks, stringent unauthorised prerequisites on imports and exports are not accounted for, though they are important determinants of regional trade flow. Also, estimates for ECOWAS are strongly affected by the treatment of zero bilateral trade flows, even between countries sharing a common currency due to significant missing observations (Masson 2008).[84] Naturally, dropping out zero observations when using the usual log form of the gravity model has the potential of leaving out valuable information on the importance of low levels of trade within the region (Silva and Tenreyro 2006).

Based on these criticisms, the catalyst of the recent methodological advances in the applied empirical trade concerns the proper handling of zero trade flows and unobservable factors or potential endogeneity problems in estimating the gravity equation parameters (Anderson and van Wincoop 2003; Cheng and Wall 2005; Linders and De Groot 2006; Silva and Tenreyro 2006; Helpman et al. 2008;

[83] The Rose (2000) study was motivated by the coming of European Monetary Union (EMU) in 1999. However, the findings were critique because data on currency union were mainly from much smaller or developing countries who had adopted single currency in the past (e.g., CFA zone, etc.) (Frankel, 2010).
[84] Unrecorded data due to weak institutions, the prevalence of civil war, etc

Westerlund and Wilhelmsson 2011; Feenstra 2015). Current studies using sophisticated econometric procedures to address these econometric biases, generally find currency union trade-generating effects that are modest in size and even statistically insignificant (Micco et al. 2003; Baldwin 2006a; Baldwin and Taglioni 2007; Serlenga and Shin 2007; Baldwin et al. 2008; Berger and Nitsch 2008). Baldwin (2006b) and Baldwin et al. (2008) conclude that reasonable estimates for the euro trade effects should be in the range of a 5-15 per cent which concurs with the estimates of Micco et al. (2003). Nitsch (2004) also demonstrates that innocuous changes in the gravity specification and data corrections reduce the estimated currency union effect. Thus, membership of the CFA franc zone at best, lead to about 55 per cent more trade with each other than with an otherwise similar non-union member in the region. In the same line, Frankel (2010) obtains trade creating the effect of around 50 per cent for the CFA franc zone after taking the conversion of the French Franc to the euro in 1999 as an exogenous shock hitting the countries that had the CFA Franc formerly linked to the French Franc. Whereas, Glick and Rose (2016) report a substantial trade effect of 105 per cent for the CFA franc zone using a panel approach with both time-varying country and dyadic fixed effects.

It is worth mentioning that we cannot assume that the effect of a currency union is identical across all currency unions, over the country of coverage and period. We, therefore, focus on the experience of the West African CFA franc zone and argue that their experience would be more representative of the trade benefit of the future currency union in West Africa. We further address the argument of unobservable or omitted variables bias and zero trade flows in the analysis using recent developments in the econometric analysis of the gravity equation. Details follow in the next section.

5.3 Methodology and data

This chapter aims to investigate the effect of the CFA franc zone on bilateral trade. We assume that this effect will be more representative of the trade benefits of the future WAMZ currency union and by extension ECOWAS. This section discusses the gravity model employed to assess the trade effect of the CFA franc on bilateral and address all key econometric issues raised in the literature. Finally, the data set, and variables are described.

5.3.1 The Gravity Model and its theoretical development

Over the last five decades, the gravity equation has emerged as the workhorse model for the analysis of international trade flows. General trade theories before 1962 have been used to explain why trade occurs but fail to explain why the level of trade between countries tends to vary over time. Tinbergen (1962) using Newton's theory of gravity found that bilateral trade for countries i and j is influenced by the economic size (measured by their respective national incomes, Y_i and Y_j) of both countries and the trade barriers (measured by geographic distance, D_{ij}) between them.

Additionally, the economic size (measured by population size; national income; per capita income) is associated with potential demand and supply of trading pairs, whereas resistance to trade factors include tariff barriers and transportation costs (Linnemann 1966). The resulting equation, analogous to Newton's law of gravity, can is expressed mathematically as:

$$T_{ij} = \beta_0 \frac{{Y_i}^{\beta 1} {Y_j}^{\beta 2}}{{D_{ij}}^{\beta 3}} \qquad 6$$

Where T_{ij} is the bilateral trade (exports or imports) from country i to country j, Y_i and Y_j are their respective economic sizes (such as GDP or GDP per capita or population), D_{ij} is a measure of the resistance factors to trade (such as geographic distance, shipping and transportation costs, language, the formation of a preferential trading area, etc.) between the countries, and β_0 is a constant of proportionality.

Since Tinbergen (1962) pioneered the gravity equations to study bilateral trade flows, these have been expanded and continued to be widely used in the analysis of a variety of policies such as regional trade agreements, monetary and currency unions and border effects (McCallum 1995; Rose 2000; Wall 2000; Rose and van Wincoop 2001; Glick and Rose 2002). In addition, the gravity equation has received sound theoretical underpinnings by Anderson (1979), Bergstrand (1985; 1989), Deardorff (1998), Eaton and Kortum (2002), Evenett and Keller (2002), Anderson and van Wincoop (2003), Chaney (2008) and Helpman et al. (2008). (A summary of key contributions of the gravity model is provided in Appendix 5A.1).

I. Stochastic Function

Taking natural logarithms of both sides of Eq. (6) and adding a random disturbance term, we derive a linear stochastic gravity equation as in Eq. (7):

$$lnT_{ij} = \beta_0 + \beta_1 lnY_i + \beta_2 lnY_j + \beta_3 lnD_{ij} + \varepsilon_{ij} \qquad 7$$

$$\beta_1, \beta_2 > 0;\ \beta_3 < 0$$

Where ε_{ij} is assumed to be independent and identically distributed (i.i.d.). In the trade literature, Eq. (7) is known as the traditional gravity model (Eichengreen & Irwin, 1998; Burger et al. 2009). The log-linear gravity equation has been estimated using cross-section ordinary least squares (OLS) techniques by assuming that the variance of the error is constant (homoscedastic) across observations (see Tinbergen 1962).[85]

However, as observed, the gravity specification in Eq. (7) is likely to be misspecified given that country pairs could have unobserved specific country characteristics not accounted. Anderson and van Wincoop (2003) provide a theoretical basis for this literature on the omitted variable bias. Introducing the multilateral resistance terms (MRTs), the authors illustrate that bilateral trade

[85] However, as pointed out by Santos Silva and Tenreyro (2006), in the presence of heteroscedasticity and zero trade flows, the OLS estimation may not be consistent and are likely to suffer from substantial heterogeneity bias. Furthermore, when individual effects are omitted, OLS estimates will be biased if the individual effects are correlated with the regressors (Martínez-Zarzoso and Nowak-Lehmann 2003).

depends not only on countries mutual resistance (such as distance, tariffs, and common language) but also on their resistance to trade with other trading partners. These resistance terms are implicitly defined by a system of non-linear equations involving all regions' GDP shares and a global interdependence that is functionally related to trade costs. Therefore, Anderson and van Wincoop (2003) argue that traditional least-squares estimates of the gravity equation are biased due to the omission of multilateral resistance terms. Thus, estimates may not be consistent and bias once researchers ignore unobserved characteristics (Alesina et al. 2003; Tenreyro and Barro 2003; Silva and Tenreyro 2006; Baldwin and Taglioni 2007).

Eq. (8) shows the augmented gravity equation of Anderson and van Wincoop (2003).

$$lnT_{ij} = \beta_0 + \beta_1 lnY_i + \beta_2 lnY_j + \beta_3 lnD_{ij} + \beta_4 lnb_{ij} + \beta_5 lnP_i + \beta_6 lnP_j + \varepsilon_{ij} \qquad 8$$

$\beta_3 = (1-\sigma)\rho$, $\beta_4 = (1-\sigma)$, $\beta_5 = -(1-\sigma)$ and $\beta_6 = -(1-\sigma)$

Where D_{ij} is a measure of the bilateral distance between i and j (a proxy for transport costs), b_{ij} is a dummy variable that takes the value 1 if two countries share a border (border effect). The variables P_i and P_j are the multilateral resistance terms for country i and j. The problem with estimating Eq. (8) is that P_i and P_j are not directly observable. Anderson and van Wincoop (2003) used iterative methods to construct estimates of P_i and P_j. However, this procedure is highly data consuming and difficult to obtain estimates. Other studies include a "*remoteness*" variable as a proxy for the MRTs, but this approach is not without challenges (Bacchetta et al. 2012; Gómez-Herrera 2013).

A variety of approaches have been taken to estimating the gravity relationship in such a way as to avoid the omitted variables bias arising from ignoring multilateral resistance terms. The widely used approach in a cross-section framework involves incorporating country-specific effects for importing and exporting countries (Feenstra 2002; 2004; Gil-Pareja et al. 2014). The recent literature concludes that country fixed effects specification of the gravity equation is in line with the theoretical concerns regarding the correct

specification of the model and yields consistent parameter estimates for the variables of interest (Baldwin and Taglioni 2007; Baldwin et al. 2008; Eicher and Henn 2011).

The log-normal country-specific effects specification of the gravity equation is shown by Eq. (9):

$$lnT_{ij} = \beta_0 + \beta_1 lnY_i + \beta_2 lnY_j + \beta_3 lnD_{ij} + \varphi_i + \gamma_j + \varepsilon_{ij} \qquad 9$$

Where φ_{i} and γ_j are country-specific effects for the exporting and importing country, respectively. Eq. (9) is consistent with Mátyás (1997) "triple-way model", as shown in Eq. (10):

$$lnT_{ijt} = \beta_0 + \beta_1 lnY_{it} + \beta_2 lnY_{jt} + \beta_3 lnD_{ij} + \varphi_i + \gamma_j + \lambda_t + \varepsilon_{ijt} \qquad 10$$

Where the three dimensions include; the country-specific effects for the exporter, φ_{i}; the country-specific effects for the importer, γ_j; and the time-specific effects, λ_t. The time fixed effect makes it possible to monitor common business cycles or globalisation trends over the whole sample.

Later, Cheng and Wall (2005) suggested that a country-pair specific effects model is appropriate to country-specific effects model shown in Eq. (10). Thus, they suggested to allow each pair of countries to have a dummy variable that may be correlated with both the bilateral trade and explanatory variables shown below:

$$lnT_{ijt} = \beta_0 + \beta_1 lnY_{it} + \beta_2 lnY_{jt} + \beta_3 lnD_{ij} + \alpha_{ij} + \lambda_t + \varepsilon_{ijt} \qquad 11$$

Where α_{ij} is the "country-pair" specific effects between the trading countries, and $\alpha_{ij} = \varphi_{\mathrm{i}} + \gamma_j$.

It is worth mentioning that the country-pair specific effects could be either of the random or the fixed effects type, which depends on the interests of the analysis, the country sample, the data properties, and the theoretical model. Martínez-Zarzoso and Nowak-Lehmann (2003) argue that from *a priori*, the random effect (RE) model would be more appropriate when estimating typical trade flows between randomly selected countries of trading partners from a larger population.

On the other hand, the fixed effects (FE) model would be a better choice when one is interested in estimating typical trade flows between *an ex-ante* predetermined selection of nations (Egger 2000; Martínez-Zarzoso and Nowak-Lehmann 2003). For this study, the intuition would lead us to treat the fixed effect specification as more appropriate given that the selected countries are members of the ECOWAS regional bloc. One implication of the country-pair fixed effects is the impossibility to estimate time-invariant drivers of trade flow, such as distance, common language, and common border.[86]Therefore, the study employs the Hausman (1978) estimation technique to check whether the country-pair effects would be treated as fixed or random.

5.3.2 Model

To estimate the effects of the currency union - the CFA franc zone - on bilateral trade flows in ECOWAS, we rely on the empirical application of the gravity model discussed in 5.3.1. Our benchmark specification is the following augmented gravity equation which incorporates a currency union indicator variable given the main focus of this paper upon the trade implications of the CFA franc zone:

$$lnT_{ijt} = \beta_0 + \beta_1 CFA_{ijt} + \beta_2 ln(Y_i Y_j)_t + \beta_3 ln(\frac{Y_i Y_j}{POP_i POP_j})_t + \beta_4 RTA_{ijt} + \beta_5 Vol_{ipt} + \beta_6 lnD_{ij} + \beta_7 Lan_{ij} + \beta_8 Bor_{ij} + \alpha_{ij} + \lambda_t + \varepsilon_{ijt} \quad 12$$

where T_{ijt} is the volume of total bilateral trade between country i and j in year t, CFA_{ijt}, is a binary variable which is unity if i and j belong to the CFA franc zone in year t, otherwise 0. $ln(Y_i Y_j)_t$ and $ln\left(\frac{Y_i Y_j}{POP_i POP_j}\right)t$ are the logs of the product of country pair's real GDP and real GDP per capita, respectively in each country;[87] RTA_{ijt} is a binary variable which is unity if country i and j belong to the same regional trade agreement in year t and 0 otherwise; Vol_{ipt} is nominal exchange rate volatility of country i and major trading partners p, measured as the five-

[86] Technically, time-invariant characteristics of the individual countries are perfectly collinear with the county-pair dummies. Moreover, fixed-effects models are designed to study the causes of changes within the region. However, the time-invariant characteristic cannot cause such a change, because it is assumed constant for each country (Kohler and Kreuter 2012).

[87] Glick and Rose (2002) combines the GDP income and population effect into a GDP per capita variable

year standard deviation of annual log differences in the nominal effective exchange rate (NEER). D_{ij} is a variable representing the geographic distance between country i and j; Lan_{ij} is a binary variable which is unity if country i and j have a common official language (English or French), and 0 otherwise; Bor_{ij} is a binary variable which is unity if country i and j share a common border, and 0 otherwise. We excluded the variable common colonial history because of perfect collinearity with the common language dummy. β_i are nuisance coefficients, and ε_{ijt} represents the error term. Our specification is in line with Glick and Rose (2002) and Cheng and Wall (2005) double index gravity model and but with different dependent variables and a different data set. Our main interest is the sign of the coefficient β_1, indicating the role of the CFA franc on intra-ECOWAS trade.

As part of the chapter's contribution, we include country-pair fixed effects, α_{ij}; year-specific effect λ_t; and an idiosyncratic effect ε_{ijt} to Eq. (12). The error component ε_{ijt} is assumed to be serially uncorrelated with zero mean and independently distributed across destinations. Eq. (12) controls $country\ i's$ and $country\ j's$ multilateral resistance terms and unobserved factors, including potential endogeneity bias through country-pair fixed effects, α_{ij}. All other shocks common to all country pairs such as policy and institutional changes, technological progress, business cycles, among others, can be accounted for through year fixed effects, λ_t. Accordingly, the coefficients of each gravity-based estimate are thus identified within the country-pair, over-time variation in trade flows and the policy variable (Glick and Rose 2002; Gil-Pareja et al. 2014; Mika and Zymek 2018).[88] Glick (2017) claims that since the within estimator relies only upon time-series variation around pair means; it enables researchers to answer the policy question of interest: *what is the trade effect of a country joining a currency union?*

[88] The indication is that pair-dummies only work when there has been significant time variation in the policy whose impact one is trying to estimate (Baldwin and Taglioni 2007). In our case, the CFA has been in existence for the entire 36 years of the research coverage. On the other hand, Glick and Rose (2012) demonstrated that controlling for unobserved factors, by inclusion of country-pair fixed effects has a significant impact on results.

5.3.3 Endogeneity issues

One potential econometric concern in estimating the effect of a currency union on trade relates to the possibly endogenous nature of the currency union. Thus, there is a debate that countries are more likely to join a currency union with countries they already have close trade links with (Persson 2001). As a result, the decision is unlikely to be purely exogenous. Therefore, trade may have 'reverse causality' on currency union, leading to overestimation of the trade effect of common currencies.[89]

In contrast, the general view is that countries join currency unions because of the expanded trade benefits. To avoid biased estimates, one needs to control for the endogeneity of the currency union, although there is not a natural remedy. The instrumental variables (IV) approach is often used to address this problem (Wooldridge 2002; Estevadeordal et al. 2003). However, the usual problem with IV techniques is finding an appropriate instrument for the currency union that is correlated with the currency union dummy, but not with trade (Barro and Tenreyro 2007; Yu 2010; Bacchetta et al. 2012).

Other studies have applied panel data techniques which include fixed effects to control the endogeneity problem due to omitted variable bias (Micco et al. 2003; Baier and Bergstrand 2007; Baldwin and Taglioni 2007; Bun and Klaassen 2007). Precisely, exporter and importer time effects or country-pair dummies are incorporated to capture any trade effect caused by reverse causality. However, Micco et al. (2003) and Tenreyro and Barro (2003) argue that the use of country-pair fixed effects does not eliminate the endogeneity problem, because a shift at some point in time in trade volumes may be related to a change in the propensity to use a common currency. In spite, the use of the fixed effects is considered good econometric practice and reasonable as a test for robustness in the recent literature (Frankel 2010).

In this study, we propose that in the case of the 15 ECOWAS countries in our sample the endogeneity problem should be less severe, and so we treat CFA

[89] Reverse causality could also arise if unobserved characteristics of trading pairs that facilitate trade are not captured or omitted in the regression. For example, compatibility in legal systems, greater cultural links, better infrastructure for bilateral transportation, may increase the propensity to share a common currency as well as encourage trade between two countries (Barro and Tenreyro 2007).

franc zone as an exogenous variable in our analysis for the following reasons. In the first place, the creation of the CFA franc zones in 1945 by France and its membership was purely for political reasons, and not motivated by extensive trade between the member countries.[90]Secondly, the subsequent conversion of the French Franc to the euro in 1999 was an exogenous shock to the countries using the CFA Franc (previously linked to the French Franc). The switch to a common currency with members of the Eurozone other than France is reasonably considered exogenous for this group of African countries (Frankel 2010). Finally, none of the English-speaking countries in ECOWAS has ever joined the currency union even though most share common borders with the CFA countries. For instance, Nigeria (a non-CFA country) shares a border with two CFA countries (Benin and Niger), and despite the extensive trade between them, Nigeria has never joined the monetary union. The same applies to countries like Ghana and The Gambia, which are both engulfed by CFA member countries and have never joined the union.

Therefore, we can assume that trade was not the main motivation for countries joining the CFA franc zone, and hence, the endogeneity problem should be less severe in our study. The argument is consistent with Tenreyro and Barro (2003) who found that the large trade effect found previously for currency unions is not accurate due to endogeneity bias, and Micco et al. (2003) found no substantial increase in trade among EMU countries before joining the monetary union. Additionally, the significance of country-pair fixed effects is that it controls for potential endogeneity problem due to the omitted variable bias (Micco et al. 2003; Baier and Bergstrand 2007; Baldwin and Taglioni 2007; Bun and Klaassen 2007; Frankel 2010; Head and Mayer 2014).

5.3.4 Data description

We perform the empirical analysis on a comprehensive data set, constructed from several sources. The sample covers all the 15-member countries of the

[90]. For instance, after independence, Guinea (former French colony) left the CFA zone in 1960 due to a political fallout with France. Also, Mali (current WAEMU member) left the CFA zone in 1960 for a similar reason and re-joined in 1984. Guinea-Bissau being the only the non-French speaking country and one of the least trading countries within ECOWAS joined the CFA in 1997 for political reasons.

ECOWAS over the period 1980–2016. We chose the end year because it is the most recent one for which full data on trade and other relevant characteristics of the ECOWAS countries are available at the time of the analysis. The start date is determined by data availability.

Dependent variable: Trade (T_{ijt})

The study uses total trade (exports + imports) as a measure of bilateral trade (T_{ij}).[91] Total trade is defined as the exports by country i to country j and the imports into country i from country j. We sourced the trade data from the International Monetary Fund's Direction of Trade Statistics (DOTs). Trade data are in thousands of US dollars; bilateral exports recorded on FOB (free on board) and the imports on CIF (cost including insurance and freight). We deflate the nominal exports and imports by the US exports and import price index (1995=100), respectively, to obtain the real values following Baldwin and Taglioni (2007) and Serlenga and Shin (2007).[92]

Independent Variables:

Product of Real GDP $(Y_i\, Y_j)t$ *and real GDP per Capita* $\left(\frac{Y_i Y_j}{POP_i POP_j}\right)t$

The GDP and GDP per capita in constant US dollars come from the World Development Indicators (World Bank).[93] We include the product of country pair's real GDP and the real GDP per capita in the gravity equation as a proxy for the economic size of the country and potential market size of both exporting and importing countries, respectively. The intuition is that the bigger the economy; the higher the aggregate potential supply, and the wealthier the people, the higher the likely demand for foreign goods, all factors remaining constant. Hence, $\beta_2\ and\ \beta_3$ in Eq. 12 are expected to be positive.

[91] Various trade measures are used in the gravity literature; ranging from exports, imports, exports plus imports, an average of exports and imports, average of exports plus imports of i and exports and imports of j.

[92] Other studies have used the US CPI or individual countries GDP deflator to deflate nominal exports and imports (Glick and Rose 2002; Micco et al. 2003). Naturally, individual countries GDP deflator is preferred; however, data is not available for all the countries considered in the study. Also. we want to keep uniformity.

[93] It is widespread practice to use real GDP instead of nominal GDP as if the gravity equation is based on a demand equation instead of an expenditure equation (Baldwin and Taglioni 2006).

The product of real GDP at time t, is computed as follows:

$ln(Y_i\, Y_j)_t = lnY_{it} + lnY_{jt}$ and real GDP per capita at time t, is as follows:

$ln(y_i\, y_j)_t = lny_{it} + lny_{jt}$

Distance (D_{ij})

Geographical distances between trading pairs is a measure of trade cost (i.e., transportation cost) or barriers to bilateral trade. Bilateral distances are computed based on the great circle distance between the capital cities of the trading countries. Geographical distance is expected to have a negative effect on trade flows. We obtained the data from the GeoDist CEPII distance database.[94]

Common language (Lan_{ij}) *and Common Border* (Bor_{ij})

Common language and common border are idiosyncratic characteristics that are considered for each pair of countries, as they may represent essential enablers to bilateral trade. Countries with a common border are more likely to have higher trade volumes since there is a reduction of transaction cost; countries speaking the same language or had the same coloniser are hypothesised to trade more with each other (cultural similarity). In ECOWAS, countries that share a common language do so because of shared colonial links in the past. The three common official languages spoken within ECOWAS are: English, French and Portuguese. Data came from the GeoDist CEPII distance database.

Regional Trade Agreement (RTA_{ijt})

The indicators of the regional trade agreement (RTA) have been built using the ECOWAS Trade Liberalisation Scheme (ETLS)[95]. There exist different trade agreements, but for this study, we focus on the revised ETLS of 1990, which is a component of the ECOWAS economic integration process. Though the impact

[94] Available at http://www.cepii.fr/anglaisgraph/bdd/distances.htm.

[95] The ECOWAS Trade Liberalisation Scheme (ETLS) is the main ECOWAS operational tool for promoting the West Africa region as a Free Trade Area. The first category came to existence in 1979 which covered only agricultural, artisanal handicrafts and unprocessed products. in 1990, a further agreement included industrial products in the scheme (see http://www.etls.ecowas.int/).

of RTAs on trade is ambiguous (Frankel and Rose 2002), a free trade agreement, in general, is expected to boost trade. From a theoretical point of view, removal of formal tariff barriers should lead to a significant increase in trade flows, and the trading partners could get a variety of benefits ranging from more rapid economic growth to increased welfare, at least in the long run (Cissokho et al. 2012).

Exchange rate Volatility (Vol_i)

We also consider the impact of nominal exchange rate volatility on regional trade. Due to the unavailability of bilateral exchange rate data for the group members, we use the nominal effective exchange rate (NEER) sourced from the International Financial Statistics (IFS) of the IMF. We follow Côté (1994) to compute exchange rate volatility as the five-year standard deviation of annual log differences in the NEER. However, the use of standard deviation (or variance) to measure volatility is also subject to criticism, for the skewed distribution of the exchange rate (heavy tails). Also, the exchange rate seems to be characterised by volatility clustering, which means that successive price changes do not seem to be independent (Côté, 1994).

The standard deviation measure is expressed as:

$$V = \sqrt{\frac{1}{n-1}\left(\sum_{i=1}^{n}(\Delta e - \overline{\Delta e})^2\right)}$$

Where n is the number of sub-periods within the period under investigation, Δe is the logarithm of the nominal effective exchange rate change. We define exchange rate volatility between countries i and j at time t, as the five-year standard deviation of annual log differences in the nominal effective exchange rate.

The conventional view in the literature is that transaction costs and uncertainty associated with exchange rate volatility discourage trade flows. Therefore, the nominal exchange rate is expected to have a negative relationship with bilateral trade flows. However, the empirical evidence is mixed as discussed in Auboin

and Ruta (2013). Additionally, we include the real effective exchange rate (REER) misalignment for robustness.[96]

Common Currency (CFA_{ij})

Following Glick and Rose (2002), we construct our primary variable of interest, i.e., currency union indicated as CFA in Eq. (13) to reflect the fact that trading countries share a common currency and central bank. In ECOWAS, eight out of the fifteen-member countries are already in a currency union (WAEMU) with a common currency, the CFA while the remaining countries still have separate currencies. Having a single currency reduces the transaction costs of trade within member countries, so the impact of a single currency on the ECOWAS trade flows is expected to be positive. It is worth mentioning that the CFA is a time-variant variable because, for the period under study, two current WAEMU members at a point in time were not members of the monetary union. Specifically, Mali left the CFA in 1962 and re-joined in 1984, and Guinea Bissau joined the CFA, for the first time, in 1997. Table 5.1 present variables definition, sources and summary of their expected signs.

[96] This was computed in chapter four as the deviation of the actual REER from its long-term or equilibrium value.

Table 5.1 Explanatory variables predictions

Variables	Definitions	Source	Expected signs
lnT_i	Log of real total trade (imports + exports)	IMF DOTs	
CFA_{ij}	Currency union dummy	Glick and Rose (2002) construction of currency union	+
$\ln(Y_iY_j)$	log of the products of country pair's real GDP	WDI	+
$\ln(\frac{Y_iY_j}{POP_iPOP_j})$	log of the products of the partner's real GDP per capita	WDI	+/-
RTA_{ij}	Regional trade agreement dummy	WTO/ETLS	+
Vol_i	Nominal exchange rate volatility	IMF IFS	-
lnD_{ij}	Log of distance	CEPII database	-
Lan_{ij}	Common language dummy	CEPII database	+
Bor_{ij}	Common border dummy	CEPII database	+
Mis_{ij}	Real effective exchange rate misalignment	IMF IFS	-
Div_{ij}	Trade diversion	-	+

5.4 Results and analysis

5.4.1 Introduction.

This section presents and discusses the results of alternative estimation procedures employed to estimate the gravity model. In section 5.4.2, we produce some preliminary analysis of the dataset and the gravity equation. These include summary statistics, unit root testing, dealing with the zero-trade flow issues and determining the appropriate model (FE or RE) for the study. Section 5.4.3 provides the baseline regression analysis. Besides, we check the robustness of our results using the PPML technique on the same explanatory variables as the initial gravity specification in section 5.4.4.

5.4.2 Preliminary tests

i. Summary statistics

The panel consists of trade data for 15 ECOWAS countries over 37 years (1980-2016). Table 5.2 presents the summary statistics for each variable. Also, Table 5.3 describes the simple correlations of the variables. As observed, the variables are not highly correlated. All the correlation coefficients are below +/- 60%. This demonstrates that collinearity is not an issue here.

Additionally, a variance inflation factor (vif) test is conducted to ensure that multicollinearity is not an issue in the gravity regression. The test results in Table 5.4 shows vif values that are less than 5. We can, therefore, conclude that collinearity or multicollinearity is not a problem since all the vif values are less than 5. Finally, we test for stationarity using Levin et al. (2002) and Im et al. (2003) panel unit root tests. The results are presented in Table 5.5. In both tests, real trade and nominal exchange rate are both stationary without trend, whereas country pair's real GDP and real GDP per capita are both stationary with a trend, giving confidence to our analysis.

Table 5.2 Summary Statistics

Variables	Obser	Mean	Std. Dev.	Min	Max
lnT_i	7770	7.654	5.211	0	17.594
CFA_{ij}	7770	0.229	0.420	0	1
$\ln(Y_iY_j)$	7770	44.258	2.175	38.697	51.446
$\ln(\frac{Y_iY_j}{POP_iPOP_j})$	7770	12.997	0.807	10.514	15.971
RTA_{ij}	7770	-	-	0	1
Vol_i	7770	0.063	0.155	0.002	1.646
lnD_{ij}	7770	6.961	0.724	4.655	8.036
Lan_{ij}	7770	-	-	0	1
Bor_{ij}	7770	-	-	0	1
Mis_{ij}	7770	0.027	18.604	-85.096	144.855
Div_{ij}	7770	-	-	0	1

Note: Number of observations 7770; Number of groups (pairs) 210; Number of countries 15

Table 5.3 Simple correlation

Variable		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1)	CFA_{ij}	1									
(2)	$\ln(Y_iY_j)$	0.11	1								
(3)	$\ln(\frac{Y_iY_j}{POP_iPOP_j})$	-0.07	0.54	1							
(4)	RTA_{ij}	0.08	0.23	0.05	1						
(5)	Vol_i	-0.16	-0.05	-0.08	-0.19	1					
(6)	lnD_{ij}	-0.04	-0.04	0.1	0.00	-0.03	1				
(7)	Lan_{ij}	0.23	0.12	-0.11	0.00	0.02	-0.56	1			
(8)	Bor_{ij}	0.53	0.15	-0.11	0.00	-0.01	0	0.21	1		
(9)	Mis_{ij}	0.00	0.00	-0.00	0.01	0.03	0.00	0.00	0.00	1	
(10)	Div_{ij}	-0.56	0.01	0.00	0.00	-0.01	0.03	-0.51	-0.09	-0.01	1

Table 5.4 Table VIF Test Results

VIF Test		
Variable	VIF	1/VIF
CFA_{ij}	1.49	0.670
$\ln(Y_iY_j)$	1.69	0.591
$\ln(\frac{Y_iY_j}{POP_iPOP_j})$	1.59	0.627
RTA_{ij}	1.12	0.890
Vol_i	1.09	0.920
lnD_{ij}	1.5	0.666
Lan_{ij}	1.52	0.659
Bor_{ij}	1.64	0.611
Mis_{ij}	1.00	0.999
Div_{ij}	1.40	0.715

Table 5.5 Panel Unit root tests

Variables	Levin-Lin-Chu		Im-Pesaran-Shin		Decision
	Without Trend	*With trend*	*Without Trend*	*With trend*	
lnT_i	-3.488*** (0.000)	-	-19.636*** (0.000)	-	Stationary
$\ln(Y_iY_j)$	18.076 (1.000)	-8.573*** (0.000)	43.030 (1.000)	-3.492*** (0.000)	Stationary
$\ln(\frac{Y_iY_j}{POP_iPOP_j})$	5.850 (1.000)	-10.200*** (0.000)	14.238 (1.000)	-4.394*** (0.000)	Stationary
Vol_i	-25.600*** (0.000)	-	-42.009*** (0.000)		Stationary

Ho: Panels contain unit roots Ha: Panels are stationary. P-values in parentheses.

*, ** and *** denotes statistical significance at the 10%, 5% and 1% level, respectively.

ii. Treatment of zero and missing observations

A descriptive analysis of the data set generated from the International Monetary Fund's Direction of Trade Statistics DOTs indicates that about 25% (i.e., 1936 out of 7770) of bilateral trade flows are recorded as zero or missing, which have the potential to distort results when taking logs, but this is far from unique (Linnemann 1966; Haveman and Hummels 2004; Helpman et al. 2008). The possible source of zero trade values includes systematic rounding errors associated with minimal trade flows, missing observations or actual lack of exchange. The empirical trade literature has emphasised the importance of dealing with zero trade values, since neglecting the matter may contribute misleading inference using the often-preferred log-linearised gravity specification.

One procedure of handling the zero trade is truncating down the observations with zero flows and using a log-linear estimation (Linnemann 1966; Frankel et al. 1997; Haveman and Hummels 2004; Baier and Bergstrand 2007; Helpman et al. 2008). The intuition for this is that these zeros are not informative; therefore, they can be dropped (Bacchetta et al. 2012). However, by deleting all zero-valued trade flows, valuable information on low levels of trade is left out of the model. This may lead to biased results, particularly when these zero-valued flows are non-randomly distributed.

Alternatively, a constant factor - usually positive integer - is added to the zero trade values to ensure that the logarithm is well defined (Linders and De Groot 2006; Silva and Tenreyro 2006; Burger et al. 2009). Though this strand of studies has found no significant difference between dropping the zeros and including a constant factor, the strategy is regarded as inadequate because the constant number added is usually selected arbitrarily with no theoretical (Linnemann 1966; Baier and Bergstrand 2007).

Finally, Silva and Tenreyro (2006) pointed out that even non-linear estimators perform weakly in the presence of heteroscedasticity and zero trade flows. The authors introduced the PPML estimation technique and highlight that, in the presence of heteroscedasticity and zero trade values, the PPML is a robust approach and performs better than OLS log-linearised specification. This

approach has been used in several estimations of gravity equations (Silva and Tenreyro 2006; Silva and Tenreyro 2010; Westerlund and Wilhelmsson 2011).

We estimate Eq. (12) – without α_{ij} and λ_t - using various estimation methods, such as pooled OLS, fixed effects, and random effects and assess whether a significant difference exists in the gravity estimates when we truncate zero trade values and when the full sample including zeros are used. The results are shown in Table 5.6. In columns 1, 3 and 5, we consider the logarithm of total trade between country i and j using $logT_{ij}$ (i.e., pairs of countries with truncated zero trade values). Whereas in columns 2, 4 and 6, the dependent variable is the logarithm of total trade between country i and j, $log(T_{ij}+1)$ (where we add 1 to each trade value).

According to the results, the estimated coefficients are highly sensitive to the treatment of the zeros. For instance, in column 1, the pooled OLS estimated coefficient for the currency union is 1.41 when we truncate the zero bilateral trade flows and 1.99 when we use the full sample in column 2. The fixed effects and random effects estimations also report differences in coefficients between the model without zeros and the ones incorporating zero trade values. This concurs with Helpman et al. (2008) that the differences in the estimated coefficients indicate the existence of bias and inconsistency when we disregard zero trade flows.

Table 5.6 Gravity regressions with and without zero trade values

	Pooled OLS		Fixed Effects		Random Effects	
Dependent variable:	1 $logT_{ij}$	2 $log(T_{ij}+1)$	3 $logT_{ij}$	4 $log(T_{ij}+1)$	5 $logT_{ij}$	6 $log(T_{ij}+1)$
CFA_{ij}	1.413*** (.076)	1.992*** (.107)	-.045 (.162)	.346* (.204)	.292** (.143)	.765*** (.184)
$\ln(Y_iY_j)$	.818*** (.017)	1.085*** (.022)	1.257*** (.066)	1.545*** (.096)	1.072*** (.046)	1.288*** (.062)
$\ln(\frac{Y_iY_j}{POP_iPOP_j})$	.405*** (.045)	.537*** (.057)	-.497*** (.108)	-1.178*** (.146)	-.196** (.083)	-.670*** (.108)
RTA_{ij}	-.029 (.064)	.713*** (.082)	-.120 (.079)	.553*** (.111)	.0303 (.064)	.745*** (.087)
Vol_i	-.563** (.218)	-1.414*** (.248)	-.024 (.174)	-.490** (.218)	-.078 (.174)	-.614*** (.218)
lnD_{ij}	-1.074*** (.045)	-1.780*** (.062)	-	-	-1.173*** (.180)	-1.663*** (.230)
Lan_{ij}	.658*** (.070)	1.646*** (.094)	-	-	1.224*** (.239)	1.854*** (.307)
Bor_{ij}	1.052*** (.077)	1.100*** (.110)	-	-	1.155*** (.314)	1.025** (.403)
Intercept	-26.028*** (.677)	-37.204*** (.901)	-40.199*** (1.826)	-46.371*** (2.707)	-29.065*** (1.849)	-31.135*** (2.465)
Observations	5834	7770	5834	7770	5834	7770
Number of groups (pairs)			210	210	210	210
$Adj-R^2$	0.56	0.57				
R^2: within			0.20	0.18	0.22	0.18
between			0.44	0.47	0.68	0.70
overall			0.35	0.38	0.52	0.53
F-Test	914.33***	1277.66***	317.64***	332.58***		
Wald χ^2 test (p-value)					2089.11***	2259.85***
MSE	2.123	3.258				
Rho					0.496	0.355
Hausman test (p-value)			0.00	0.00		

Notes: *, ** and *** denote the rejection of the null hypothesis at the 10%, 5% and 1% significance level. Standard errors in parenthesis

The above analysis shows how important it is to control zero trade flows in the gravity regression. We follow the conventional method (Felbermayr and Kohler 2006) of adding 1 to all the trade values $log(T_{ij}+1)$. A drawback of this

specification is that different results can be generated depending on the constant added to actual trade values.

Moreover, techniques that incorporate zeros may produce biased estimates if some trade flows are incorrectly reported as zeros (Head et al. 2010). However, ignoring zero trade values could leave out valuable information on low levels of trade in practice. Likewise, our sample is a predetermined selection of countries instead of a random choice.

We also estimate the PPML in our sensitivity analysis to verify that our results are robust to this specification, whereby in the presence of zero trade values, the PPML incorporates the zeros and delivers consistent estimates better than OLS log-linearised specification (Silva and Tenreyro 2006; Burger et al. 2009; Head et al. 2010; Gómez-Herrera 2013).

iii. Determining the appropriate model (FE or RE)

The next estimation issue to be addressed is choosing the appropriate estimation method for the analysis. As discussed in section 5.3.1, it is essential to determine if the country-pair effects in Eq. (12) would be treated as fixed or random. As a result, the Hausman (1978) test is performed to test between a fixed effect estimator (FE) and random effects estimator (RE) using Eq. (12) without α_{ij} and λ_t.

The null hypothesis of the Hausman specification test is that the regressors and unobserved heterogeneity are uncorrelated. When they are not correlated, both the RE and FE estimators are consistent, but the RE estimator is efficient. However, if they are correlated, the FE estimator is consistent, but the RE estimator is not. The Hausman test results strongly reject the null hypothesis of no correlation between the individual effects and the explanatory variables ($\chi^2(8) = 85.59^*$). This suggests that the fixed effect is the appropriate model for gravity regression.

Furthermore, we conduct some specification tests for potential problems with the panel model before estimating the baseline FE regression.

The modified Wald test for group-wise heteroscedasticity is used to assess the potential problems of heteroscedasticity in a simple FE regression. The null hypothesis is homoscedasticity (or constant variance). The test results in Box 1 (see appendix 5A.2) shows that the null is strongly rejected, and we can conclude the presence of heteroscedasticity. Also, the Breusch-Pagan / Cook-Weisberg heteroscedasticity test results (see Box 2. appendix 5A.2)[97] suggests that the residuals are heteroskedastic.

As a result, we employ robust standard errors for the fixed effects estimates to address the problem of heteroscedasticity. When heteroscedasticity is present, robust standard errors tend to be more trustworthy. Also, as mentioned in section 5.3.2, the model incorporates country-pair fixed and time effects. The significance of fixed effects is that the country-pair dummies are used to control for heterogeneity which captures time-invariant (bilateral distance, common language and the like), and unobserved country-pair effects. Time dummies also control the effect of the business cycle and globalisation. An F-test for the inclusion of both time and country-pair fixed effects strongly indicate they are jointly significant. F-test results, given by (244, 7520) = 32.53, *p* value=0.00 shows that both dummies are jointly significant at the 1% significance level. Therefore, the fixed effects regression will include country-pair and time fixed.[98]

5.4.3 Baseline regression

This sub-section presents and discuss the baseline results of estimating the augmented gravity equation (12). First, the section provides an estimate of the CFA franc zone effect on intra-ECOWAS trade for the period 1980-2016 using ordinary least squares (OLS) with country-pair and year fixed effects. Although the preferred method is the FE, we extend the analysis using pooled OLS without country-pair effects in order to estimate time-invariant variables and to have a more profound assurance of resilient results under different estimation method.

[97] Heteroscedasticity causes standard errors to be biased because OLS assumes that errors are both independent and identically distributed.

[98] Besides, Baldwin and Taglioni (2007) argue that the time dummies eliminate the bronze mistake (incorrect deflation of bilateral trade), and the pair dummies reduce the severity of the gold-medal error by removing the cross-section correlation between the omitted and P terms and the included variables.

i. Fixed effects

Table 5.7 presents the benchmark estimation outcomes of Eq. (12) using ordinary least squares and employing country-pair or/and year fixed effects, identified in the within-dimension. The country-pair fixed effects to control for each trading partner's multilateral resistance factor or unobserved bilateral heterogeneity as suggested in Anderson and van Wincoop (2003), and year fixed effects added to correct for common shocks and trends. Observations in the sample are clustered across different periods by the trading countries' pairs, and thereby all time-invariant pair specific variables such as geographical factors are now absorbed into the pair fixed effects. Standard errors of estimates are robust to heteroscedasticity and correlation of error terms within country-pairs. The gravity equation fits the data well based on the R^2 values reported in Table 5.7. In column 1, the regression model accounts for 79% of the variance in bilateral trade flows in ECOWAS. Likewise, in columns 2-4, the regression models explain 74% of the variations in bilateral trade flows, respectively.

The first column of Table 5.7 reports regression estimates using the logarithm of the total bilateral trade (where we truncate pairs of countries with zero bilateral trade flows) as the dependent variable. Regarding the variable of interest, the CFA franc zone, we find an estimated coefficient that is positive (0.12) but statistically insignificant at conventional levels. The coefficients of real GDP and real GDP per capita are statistically significant, with elasticities of 1.71 and -1.103, respectively. The estimated coefficient of RTA is negative (-1.71) and statistically significant, whereas nominal exchange rate volatility is statistically insignificant. This outcome is not unexpected due to omitting zero trade values. The estimation uses the sample of countries with real trade volumes between them for the sake of log-linear estimations. As noted in section 5.4.2, about a quarter of bilateral trade flows are recorded as zero or missing in our data set. Therefore, disregarding or deleting all the zero trade values may produce biased estimates as reiterated in Helpman et al. (2008). In particular, this could leave out valuable information on the low levels of trade within the ECOWAS.

Consequently, we proceed by employing the conventional method of adding a constant (here we use 1) to all the trade values to utilise the full sample including zero trade flows in a log-linear estimation (see section 5.4.2 for a detailed discussion). Column 2 of Table 5.7 contains the regression results with country-pair fixed effects (but no year effects) and using the logarithm of bilateral trade, including zero trade flows as the dependent variable. The results show that the estimated coefficients, overall, are economically and statistically significant. The estimated coefficient of the CFA is positive, with the elasticity of (0.35) and statistically significant. The coefficient implies that CFA franc zone (WAEMU) members on average trade about 42% $(given\ by\ (e^{0.35} - 1) * 100)$ more with each other than non-members with independent currencies within ECOWAS, holding other factors constant. This modest coefficient is somewhat consistent with the recent literature position of a modest trade effect of single currencies when country fixed effects are taken into consideration (Baldwin and Taglioni 2007; Baldwin et al. 2008; Silva and Tenreyro 2010; Chen and Novy 2017).

Concerning the estimates of the other gravity variables; first, the results show that the joint real GDP of country i and country j significantly increase bilateral trade. Consistent with the gravity equation assumption that economically larger countries trade proportionately more among themselves. Moreover, this is coherent with the trade pattern in ECOWAS discussed in chapter 3, where the four largest (per GDP) members account for more than 70% of the total regional trade in most period under study. Ajayi (2005) suggests that the dominance of these countries means that trade activities within the region rely heavily on their economic performance. As a result, development in the core countries will deliver more of an impact on intraregional trade than policies adopted by the smaller member countries.

In contrast, an increase in joint real GDP per capita reduces bilateral trade against intuition. The estimated coefficient of regional trade agreements (RTA) is positive (0.55) and statistically significant. The suggestion is that the ECOWAS Trade Liberalization Scheme (ETLS), which was revised in 1990 to include manufacturing products in the free trade agreement scheme, has promoted regional trade flows, suggesting that the ETLS has contributed to the

removal of some trade barriers in ECOWAS. Finally, the estimated coefficient of nominal exchange rate volatility is negative (-0.49) and statistically significant. The indication is that exchange rate volatility reduces bilateral trade in ECOWAS, supporting the conventional view that uncertainty and transaction costs associated with the floating exchange rate discourage trade flows.

We now introduce year fixed effects in our regression to account for all other shocks and trends common to all country pairs in addition to country-pair fixed effects in column 3. Mátyás (1997) suggests that shocks common to trading pairs such as policy and institutional changes, technological progress or business cycles can affect the pattern of trade flows. In comparison to column 2, the estimated coefficients increase marginally but remain statistically significant except for the regional trade agreements and nominal exchange rate volatility. The point estimate of the CFA franc effect rises to 0.47 (60%), but still lower than the 0.72 found in Glick and Rose (2016) using a similar method, but somewhat different CFA member countries.[99] On the other hand, the effect is somewhat bigger than Nitsch (2004) and Carrère (2004) comparable estimate of 55% and 51% trade increase for the CFA franc member in West Africa, respectively using different specifications.

Other noteworthy findings in column 3 show that an increase in real GDP promotes bilateral trade, whereas an increase in real GDP per capita reduces bilateral trade flows. This is counterintuitive. However, as explained in section 5.3.4, the real GDP per capita in the gravity equation is a proxy that measures a country's standard of living, or it tells how prosperous citizens of a country are. The negative coefficient suggests that the wealthier the citizens of these countries are, the higher the demand for foreign goods, all factors remaining constant. Most of these foreign goods are frequently imported from the developed countries such as European countries and U.S. than within the bloc. This typifies the stylised facts presented in chapter three where trade within ECOWAS is very low. Awa (2015) termed such an adverse effect on trade flows are trade resisting.

[99] Glick and Rose (2016) estimate trade elasticity of 0.72, for the CFA Franc zone when they dis-aggregated the currency unions' effect of various currency unions in dyadic fixed-effects estimation.

Interestingly, the estimated coefficient of regional trade agreements (RTA) is statistically insignificant. This result is unexpected because the ETLS has partly contributed to the removal of some trade barriers in ECOWAS; however, as remarked in the literature the impact of RTAs on trade is ambiguous (Frankel and Rose 2002). Finally, the estimated coefficient of nominal exchange rate volatility is also statistically insignificant, but this finding is not unique given there is no consensus regarding exchange rate volatility on trade (Auboin and Ruta 2013).

Consequently, in column 4 we consider a specification that replaces nominal exchange rate volatility Vol_i with REER misalignment, Mis_i. Mis_i is the deviation of the actual REER from the equilibrium REER. As observed, the estimated coefficient of CFA remains almost the same (0.466) after including Mis_i and dropping Vol_i, which provides a pragmatic justification for our estimates. Moreover, the estimated coefficients of the remaining gravity variables do not change substantially in sign and significance. We find a positive (0.004) and statistically significant coefficient for Mis_i, suggesting that periods of REER undervaluation contributed positively to intra-ECOWAS trade, though the effect is moderate.

Finally, comparing the coefficient of CFA in column 1 with columns 2, 3 and 4 of Table 5.7, we can conclude that using the CFA franc as a common currency has furthered bilateral trade among members. Specifically, based on our preferred specification – including country-pair fixed effects, time fixed effects and controlling for zero trade flows -, we find that on average CFA franc members' trade approximately 60% within the union relative to the non-member countries with independent currencies in ECOWAS, holding other factors constant. These findings demonstrate that common currency has the potential to improve ECOWAS intra-regional trade such that its ability to form a regional monetary union in the future could in part increase trade among the member countries.

Table 5.7 Baseline gravity results

Estimation	Country-pair fixed effects				Pooled OLS	
	1 (0's)	2	3	4	5	6
CFA_{ij}	.121 (.166)	.346* (.208)	.471** (.211)	.466** (.210)	2.026*** (.106)	2.343*** (.118)
$\ln(Y_iY_j)$	1.706*** (.336)	1.545*** (.096)	2.193*** (.413)	2.165*** (.413)	1.090*** (.021)	1.063*** (.022)
$\ln(\frac{Y_iY_j}{POP_iPOP_j})$	-1.103*** (.358)	-1.178*** (.158)	-1.854*** (.416)	-1.828*** (.416)	.588*** (.060)	.653*** (.061)
RTA_{ij}	-1.711** (.708)	.553*** (.099)	-.100 (.875)	-.116 (.873)	1.431*** (.350)	1.423*** (.349)
Vol_i	.172 (.193)	-.490* (.275)	-.177 (.277)	-	-1.331*** (.284)	-1.146*** (.288)
lnD_{ij}	-	-	-	-	-1.785*** (.061)	-1.819*** (.062)
Lan_{ij}	-	-	-	-	1.637*** (.098)	1.837*** (.107)
Bor_{ij}	-	-	-	-	1.097*** (.109)	1.035*** (.109)
Mis_{ij}	-	-	-	.004** (.001)	-	-
Div_{ij}	-	-	-	-	-	.579*** (.106)
Intercept	-52.214*** (10.245)	-45.776*** (2.694)	-65.890*** (12.969)	-64.927*** (12.955)	-38.753*** (1.024)	-38.603*** (1.019)
Observations	5834	7770	7770	7770	7770	7770
Number of groups (pairs)		210	210	210		
Time Effect	YES	NO	YES	YES	YES	YES
Country-pair fixed effects	YES	YES	YES	YES	NO	NO
R^2	0.79	0.74	0.74	0.74	0.57	0.57
F-Test	256.02*	299.85*	250.82*	252.62*	365.08*	360.45*
RMSE	1.508	2.584	2.569	2.568	3.245	3.238

Notes: *p<0.1, **p<0.05, ***p<0.01. Robust standard errors in parenthesis. The dependent variable is the log of real trade $ln(T_{ij})$ in column 1 and $ln(T_{ij}+1)$ in columns 2-6.

5.4.4 Pooled OLS

As we observed in columns 1-4 of Table 5.7, the country-pair fixed effects automatically drop all the time-invariant variables in the estimation because of perfect multi-collinearity. However, time-invariant variables such as distance, common language, are hypothesised to be important in understanding the trade pattern within ECOWAS. To ameliorate this problem, we extend the analysis

using pooled OLS without country pair effects to incorporate all the time-invariant variables. Before, explaining the pooled OLS regression output, it is worthy to note that the regression model accounts for 57% of the variance in bilateral trade flow in ECOWAS in columns 5 and 6. The fall in the R^2 value relative to those reported in columns 1-4 could be explained by the exclusion of country-pair effects in the pooled OLS estimation. Now, we explain the pooled OLS regression results reported in columns 5-6 of Table 5.7.

In column 5, we estimate the gravity equation, including year effects and find a positive and statistically significant coefficient of 2.03 for the CFA. As expected, most of the traditional gravity variables have the expected sign and are statistically significant and yield plausible elasticities broadly in line with those obtained in the gravity literature. Both the joint real GDP and real GDP per capita of countries i and j significantly increase bilateral trade, belonging to a regional trade agreement or free trade area has a positive effect on regional trade, while exchange rate volatility of country i against a trading partner lowers bilateral trade. The estimated coefficient of distance is negative and statistically significant, consistent with our *a priori* expectations. The indication is that long-distance reduces market preference because they are increasingly costly to serve. The other variables - shared border and common language - increase bilateral trade, and all estimates are statistically significant. The result agrees with Hulej et al. (2006) argument that neighbouring countries tend to trade more with each other due to the weak transportation links between many West African countries. Likewise, the common language shows an apparent concentration of intra-language-zone trade, proving the significant impact of the two widely spoken official languages (English and French) in the region.

Finally, in column 6, we investigate the possibility that the stimulus to trade among WAEMU members comes at the expense of trade with non-members as a form of trade diversion (Balassa 1967), whereby currency unions are trade creating if trade increases among members without reducing trade with non-members. Likewise, they are trade diverting if increased intra-union trade decreases trade with the non-members. To test this conjecture empirically, we define a dummy variable *trade diversion* that takes the value of 1 if either, country i or country j (but not both) belongs to WAEMU, otherwise 0 if both i

and *j* are in a currency union or both are not in a currency union with any other country.

The estimated coefficient of trade diversion is positive and statistically significant; suggesting that overall, there is a considerable trade creating effect in WAEMU. Thus, on average the WAEMU appear facilitating trade creation since its formation in 1994. This finding is consistent with Carrère (2004) arguing that the convertibility regime of the CFA franc lowers the risk of trade diversion since it makes a transaction with the rest of the world more accessible and safer as France guarantees convertibility.[100] Similarly, Musila (2005) reported that the intensity of trade creation is higher in the ECOWAS region than other regional blocs in Africa. The estimated coefficients for each of the remaining explanatory variables carry the expected sign and are statistically significant, with magnitudes almost the same as in column 5. The point estimate on currency union, however, is 2.34, higher than that of column 5. The suggestion is that membership of Franc zone trade about six times greater than that of other pairs in West Africa.

In summary, membership of the CFA franc zone increases bilateral trade among the members with elasticities that vary between 2.03 and 2.34. These estimates are economically large and are therefore consistent with the hypothesis that the OLS estimates suffer from an upward ability bias (Persson 2001). Conversely, we observed that controlling for unobserved factors affecting trade between country pairs through country-pair and year fixed effects in column 3 (see Table 5.7) generally reduces the estimated impacts of CFA franc zone on bilateral trade. Therefore, based on the best specification – including country-pair and time fixed effects and controlling for zero trade flows -, we conclude that on average the CFA franc members' trade approximately 60% within the union relative to the non-member countries with independent currencies in ECOWAS, holding other factors constant.

[100] Through the establishment, by the central bank in CFA franc zone, of an operating account with an –in principle- unlimited overdraft facility for each central bank.

5.4.5 Sensitivity analysis

Recent studies (Silva and Tenreyro 2006; Helpman et al. 2008; Siliverstovs and Schumacher 2009; Silva and Tenreyro 2010; Westerlund and Wilhelmsson 2011) have indicated that OLS estimates can cause severe bias due to zero trade flows across trading partners. Consequently, Silva and Tenreyro (2006) proposed the PPML estimation as consistent and unbiased in the presence of heteroscedasticity while allowing observations with zero-valued trade flows. Hence, we determine whether our main finding of the CFA franc effect is robust using the PPML technique on the same explanatory variables in the gravity specification. The results are reported in Table 5.8. First, to assess the impact of zero trade flows on our estimates, we provide PPML estimates of our coefficients with zero-valued trade flow excluded in column 1, we then report PPML estimates based on all available observations in columns 2-3. The dependent variable is the total bilateral trade in levels. One significant feature of the PPML method is that it allows for easy incorporation of variables with zeros. Further, the estimated models in columns 1-2 and 3 explain about 69% and 70% of the variance in the bilateral trade. The high Pseudo R^2 values give confidence to the results reported in Table 5.8.

As shown in Table 5.8, the magnitude of the PPML estimates tends to be lower compared to the OLS estimates in Table 5.7 - this is in line with Silva and Tenreyro (2006) and Siliverstovs and Schumacher (2009) - with most of the basic gravity model variables being statistically significant with expected signs. Crucially, the estimated coefficient of the CFA franc effect on trade remains significant and positive; however, the magnitude of the PPML estimation is larger than the fixed effects estimates found in Table 5.7. The indication is that CFA Franc member countries on average trade about 226% more among themselves than the non-WAEMU countries in ECOWAS. This estimate is implausibly high. This could be associated with not using fixed-effect Poisson estimation. Going forward, this would be considered in future research to determine if the size of the coefficient will reduce.

On the other hand, the coefficients of real GDP and real GDP per capita are positive and statistically significant; however, the estimated coefficients are less

than 1 and relatively less than the coefficients of the POLS and fixed effects. Silva and Tenreyro (2006) noted that the PPML estimation reduces the coefficients of the real GDP and real GDP per capita, and are not always close to 1 as seen in most traditional estimates. The RTA shows a moderately positive effect on bilateral trade flows, while exchange rate volatility negatively impacts trade flows. Furthermore, the results suggest a significantly negative, though moderate effect, of distance on bilateral trade. Trading partners sharing a common land border have a positive and significant effect on bilateral trade. On this occasion, however, the effect of speaking a common language on trade is not statistically significant. This contrasts with the conventional view in the literature that countries speaking the same language tend to trade more

Column 2 of Table 5.8 reports the PPML estimation for the sample with zero trade values. Except for the estimated coefficient of the common language (which is statistically insignificant), all the estimated coefficients show the expected sign and are statistically significant at conventional levels. Consistent with Silva and Tenreyro (2006), the PPML estimation shows the lowest disparities in the magnitudes of the coefficients from the observations with positive trade values (column 1) and using full observations including zeros in column 2. We observed a similar pattern for our variable of interest, CFA franc, and the other control variables, where the estimated coefficients marginally increase. We also experimented by using PPML with year effects, and the results remained virtually unchanged in column 3. We checked the adequacy of the estimated models by performing a heteroscedasticity-robust RESET test (Ramsey 1969) following Silva and Tenreyro (2006). The models estimated using the Poisson regressions pass the RESET test, indicating no evidence of misspecification of the gravity equations estimated using the PPML. Furthermore, the Pseudo R^2 in column 1, 2 and 3 are 0.66, 0.69 and 0.7, respectively.

In conclusion, consistent with the estimates in Table 5.7 and 5.8, CFA franc is found to increase bilateral trade among the WAEMU members. However, controlling for zero trade flows and unobserved factors affecting trade between country pairs through country-pair and year fixed effects in column 3 of Table 5.7, the estimated impacts of CFA franc on bilateral trade is not unusually high

relative to estimates in columns 5-6 in Table 5.7 and columns 1-3 in Table 5.8. This corresponds with Persson (2001) argument that estimates suffer an upward ability bias if unobserved factors affecting trade between country pairs are not considered. Therefore, based on the best specification – including country-pair and time fixed effects and controlling for zero trade flows – in Table 5.7, we conclude that on average the CFA franc raised bilateral trade among members by 60% relative to the non-members within ECOWAS, holding other factors constant.

Table 5.8 Sensitivity analysis

Estimation	PPML		
Variable	1 (no 0s)	2	3
CFA_{ij}	1.116*** (.105)	1.225*** (.106)	1.295*** (.112)
$\ln(Y_iY_j)$	.645*** (.028)	.673*** (.028)	.682*** (.031)
$\ln(\frac{Y_iY_j}{POP_iPOP_j})$	.443*** (.048)	.430*** (.048)	.499*** (.049)
RTA_{ij}	.163** (.068)	.1666** (.070)	.003 (.266)
Vol_i	-.885** (.453)	-.944** (.458)	-.748* (.399)
$\ln(D_{ij})$	-.092** (.043)	-.126*** (.044)	-.113** (.045)
Lan_{ij}	.073 (.095)	.082 (.096)	-.076 (.089)
Bor_{ij}	.678*** (.066)	.681*** (.067)	.728*** (.065)
Intercept	-23.513*** (1.390)	-24.566*** (1.374)	-26.395*** (1.698)
Observations	5834	7770	7770
Time Effects	NO	NO	YES
Pseudo R^2	0.66	0.69	0.70
Wald χ^2 test (p-vlue)	0.00	0.00	0.00
RESET test p-values	0.5329	0.6444	0.257

Notes: *p<0.1, **p<0.05, ***p<0.01. Robust standard errors in parenthesis.
The dependent variable is real bilateral trade (T_{ij}) in levels

5.5 Chapter Summary

This chapter evaluates the effect of the CFA franc zone on bilateral trade in ECOWAS. Within ECOWAS, there are two currency arrangements; the CFA franc- having a shared central bank and a common currency pegged to the French franc (now euro) since the members attained independence in the 1960s- and the WAMZ with separate national currencies but in the process of establishing a common currency. The aim was to investigate whether sharing a common currency augments bilateral trade for the West Africa CFA zone members to support the quest for a broader ECOWAS currency union.

The chapter, therefore, estimates the effect of the CFA franc on bilateral trade in ECOWAS using recent developments in the econometric analysis of the gravity equations and a panel of annual data that covers the 15-member countries of ECOWAS for the period 1980-2016. While different econometric methodologies deliver different results, after controlling for unobserved factors using country-pair fixed effects and year fixed effects, and taking account of zero trade values, we find that membership of the CFA franc has promoted bilateral trade among members by 60%. This result is somewhat consistent with recent literature that generally finds modest currency union trade generating effects, in contrast to Rose (2000). The reason is that the estimate is for a monetary union where for historical reasons, membership is exogenous, and in which we controlled for treatment effects. These contributions might explain differences in the CFA franc effect on bilateral trade in previous studies.

Furthermore, the PPML estimation, produced consistent and unbiased estimates in the presence of heteroscedasticity reinforcing the positive CFA franc trade effect. Not only has there been a positive CFA franc effect on bilateral trade in ECOWAS, but we also find a significant trade creating effect instead of trade diverting in the zone. The findings help to evaluate the potential trade benefits of a full ECOWAS currency union. There may be a host of political and economic reasons why the ECOWAS authorities wish to introduce a common currency. However, based on our evidence, we can argue that there is a potential acceleration of intra-regional trade with a common currency. In

effect, the potential trade creation associated with a common currency is a helpful guide for the ECOWAS deep integration agenda.

Chapter 6 Conclusions, policy implications, and future work

6.1 Conclusions

This thesis provided an assessment of monetary integration in the West African Monetary Zone (WAMZ) to inform policy about the feasibility and economic implications of this arrangement. The motivation of the thesis emanated from the assertion in some papers that monetary union could spur macroeconomic integration and economic growth amongst these countries (Cobham and Robson 1997; Debrun et al. 2005; Fielding and Shields 2005; Tsangarides and Qureshi 2008; Ekpo and Udoh 2014). Specifically, currency unification provides a possible solution in generating opportunities to exploit economies of scale in production and trade, promote regional stability and guarantee the groups influence in international negotiations (Fielding and Shields 2005; Masson and Pattillo 2005; Masson 2008; Oshikoya 2010; Robson 2010).

Nonetheless, monetary integration is a long-standing facet of policy and development strategy in West Africa. The reasons include: (1) most of the economies in West Africa have been characterised by exchange rate instability, financial fragility, high inflation and low intra-regional trade since the countries gained independence in the 1950s and 1970s (2) The economically small size and respective small national markets of most of the countries represent severe constraints on their autonomous development.

The WAMZ was formed in 2000 by the Heads of State of five West African countries (The Gambia, Ghana, Guinea, Nigeria, and Sierra Leone) - all former British colonies except Guinea - in Accra, Ghana. Liberia later acceded to the WAMZ Agreement in 2010 and became the sixth member of the WAMZ. The intention is for WAMZ to integrate with the existing monetary union, the Economic and Monetary Union (WAEMU); and establish a common currency for the 15 ECOWAS members in 2020. Consequently, a prospective ECOWAS monetary union is decisive on the success or not of WAMZ.

The OCA literature stipulates that participating in monetary union invariably entail the loss of members' autonomy over national monetary policy instruments

to stabilise the country-specific macroeconomic shocks (Mundell 1961). However, the new OCA literature focuses on the potential benefits. First, joining a monetary union is accompanied by the adoption of a more efficient and credible monetary practice (Barro and Gordon 1983; Giavazzi and Giovannini 1989; Beetsma and Giuliodori 2010). Second, by eliminating exchange rate risks and transaction costs, a common currency can spur trade and business cycle synchronisation (Frankel and Rose 1998; Rose 2000; Frankel and Rose 2002; Baldwin et al. 2008; Tavlas 2009). The thesis provides a comprehensive review of the OCA literature in Chapter 2.

Therefore, the main goal of the thesis is to contribute to the key issues of the cost and benefit of monetary integration in WAMZ that has not been sufficiently done in the existing literature. Specifically, drawing on the extant literature on monetary integration, as well as on the Eurozone experiences, this thesis examines the economic conditions for monetary integration and the potential trade benefit associated with a common currency, since the issue has not been sufficiently considered. The findings could inform policy about the implications of currency unification in the region.

The thesis is divided into three research themes and addresses the two main research questions. Chapter 3 argues that an evaluation of West African history and its relations with the development of monetary integration from the pre-colonial era to the present day is useful to offer an understanding of the present monetary integration arrangements in West Africa. A review of the West African's past suggests that, before European contact, common currencies such as the cowries and gold existed, although their use was frequently limited to certain types of transactions or specific groups of people. The economic structure was sustained by the kingdoms and cultures of West Africans that were relatively well integrated in precolonial times. The establishment of European rule during the colonial era transformed the monetary systems, resulting in the pace and intensity of commercial activity in West Africa. Thus, the authorities took steps to standardised currencies within the sub-region by promoting (or imposing) single currency. The two main currencies were the West African Shilling for the British colonies and the CFA Franc for the French colonies. Accordingly, these common currencies enabled deep international

trade between the West African colonies and the West, at the expense of intra-West African trade.

After independence, most of the Francophone countries continued to keep the single currency while the Anglophone countries abandoned the West African Currency Board (WACB), creating unstable and non-convertible national currencies. Whereas the action of the Anglophone countries has contributed to the low intra West African trade, the chapter argues that a common currency would not adequately address the recurrent low intra-West African trade because of the direction of trade amongst these countries; continental focused. The discussion in chapter 3 adds weight to the argument supporting structural transformation and export diversification as critical for improving intra-regional trade.

Chapter four focuses on one of the main issues in the debate of the monetary union in the WAMZ, the degree of asymmetry in macroeconomic shocks; whether they differ across these countries. The analysis is vital to evaluate the suitability of these countries for a monetary union. Furthermore, to avoid asymmetric response from common monetary policy, WAMZ countries must achieve symmetric macroeconomic shocks with the rest of the union before upscaling to a full monetary union. Therefore, this chapter provides a contemporary examination of the degree of asymmetry by assessing the behaviour of the real effective exchange rates (REER) across WAMZ countries. Providing evidence on REER behaviour among prospective monetary union candidates would suggest the degree of the potential costs of giving up monetary policy autonomy.

First, the findings show that the long-run behaviour of the REERs can be explained by changes in productivity differentials, terms of trade, the real price of oil, government consumption and trade openness across WAMZ countries. However, the Johansen cointegration analysis shows significant cross-country differences in the reaction of the members REER to changes in the common set of fundamentals. Also, the country-specific VECM results show that the existence of REER means reversion in 3 countries, but the speed of adjustment varies across candidate countries, suggesting differences in the persistence of

shocks to REER. The derived REER misalignments suggest that before 2007 the REERs of WAMZ members experienced high divergence from equilibrium, but the degree of an individual country's misalignment and between countries appears to be diminishing; in other words, there is a convergence towards the equilibrium since 2007.

Second, the chapter examines REER responses to shocks in exchange rate determinants for the group. Oil price, supply and demand shocks are identified using long-run restrictions in a structural VAR model. In the case of the OCA theory, the prevalence of external shocks (such as the price of oil) may justify common monetary policy within the region. The chapter reports significant differences in the response of REER to real oil price, productivity (supply) and demands preference shocks across these economies using the impulse response analysis. Besides the relative contribution of these shocks to REER movements in the short and long run appears to be different across economies from the variance decomposition analysis.

In summary, the key evidence reported from VECM, impulse response, and variance decomposition analysis points to heterogeneous economies; the five economies are structurally different or asymmetric. The findings imply that a common monetary policy for the group would yield asymmetric responses. The presence of large idiosyncratic shocks implies the need for different policy responses to adjust to macroeconomic shocks. The evidence provided strengthens the case for policy autonomy in the region and is consistent with previous studies showing considerable economic divergences amongst WAMZ countries as the main constraint to monetary union. This is consistent with previous studies that have suggested considerable economic divergences amongst WAMZ countries as a constraint to the proposed monetary union.

Chapter 5 evaluates the effect of the CFA franc zone on bilateral trade in ECOWAS. Within ECOWAS, there are two monetary arrangements; the CFA franc- having a shared central bank and a common currency pegged to the French franc (now euro) since the members attained independence in the 1960s- and the WAMZ with separate national currencies but in the process of establishing a common currency. The main aim of the chapter is to demonstrate

whether sharing a common currency augments bilateral trade to underpin the quest for a broader currency union in West Africa.

Therefore, the chapter estimates the effect of the CFA franc on bilateral trade using recent developments in the econometric analysis of the gravity equations and a panel of annual data that covers the 15-member countries of ECOWAS for the period 1980-2016. While different econometric methodologies deliver different results, after controlling for unobserved factors using country-pair fixed effects and year fixed effects, and taking account of zero trade values, we find that membership of the CFA franc has promoted bilateral trade among members by 60%. Furthermore, Poisson pseudo-maximum likelihood (PPML) estimation, producing consistent and unbiased estimates in the presence of heteroscedasticity reinforced the positive CFA franc trade effect. Not only has there been a positive CFA franc effect on bilateral trade, but we also find a significant trade creating effect instead of trade diverting in the zone.

The overarching conclusion from the extensive analyses carried out in this thesis can be summarised in two main themes: asymmetric shocks are inevitable because of structural economic differences, but this could be compensated with the potential trade increase.

6.2 Policy implications

The findings of this thesis have important policy implications. These can be categorised into two main themes: the cost and benefits of monetary integration in WAMZ. Whereas chapter 4 provides the relative costs associated with surrendering sovereign monetary policy autonomy to a supranational organisation, chapter 5 highlights the potential trade benefit from a common currency.

Before, chapter 3 demonstrates that WAMZ authorities could reflect on good historical practices for the current currency union arrangement. This would require political commitment to give up sovereignty for a regional administration system akin to what existed in the pre-independence era. Furthermore, some current ECOWAS institutions could be used to facilitate the harmonisation of

institutions in order to strengthen the integration process. On the other hand, the thesis argues, based on the historical and contemporaneous accounts that a common currency would not adequately address the recurrent low intra-West African trade unless other simultaneous policies are acted out to alter the focal point of the trade from continental to regional concentration.

Chapter 4 infers essential policy implications about whether membership of the monetary union is feasible for the WAMZ countries. Precisely, whether the potential cost of giving up independent monetary policy autonomy is minimised with symmetric macroeconomic shocks. The chapter reports that the relative significant impact of common fundamentals on REER is different across economies suggesting lack of macroeconomic policy coordination in WAMZ.

Also, the chapter highlights that oil price, productivity and demand shocks are asymmetric across the countries. The suggestion is that in the presence of asymmetric shocks, a common monetary response would not be adequate, constraining the monetary union bind. Countries will be tempted to react by implementing structural adjustments designed to improve competitiveness. In these economies, exports have been the principal source of economic growth in WAMZ and the sector is hardly diversified, making these countries particularly vulnerable to increased competition. It would appear based on the findings that a common policy would not suffice across these countries; strengthening the case for policy autonomy in the region.

Notwithstanding, there is a case for a monetary union, but it is indispensable that authorities appreciate the potential asymmetries from common policies and shocks. To avoid asymmetric responses from policy changes the following policy recommendations can be made:

- WAMZ members with similar structural shocks with some WAEMU countries could join the existing monetary union.
- Structural transformation and economic diversification are crucial to achieving convergence among these countries. This requires scaling up toward activities with higher technology (at least small-scale manufacturing), which can transform the raw materials and primary commodities efficiently into manufactured goods would yield significant

dividends regionally (Rodrik 2008; Stiglitz and Greenwald 2014; Guzman et al. 2018). This concurs with Kenen (1969) that the more diversified an economy is, the less vulnerable it is to sector-specific shocks, and the smaller is the stabilisation cost of joining a monetary union.

- Moving forward, a political commitment by members to establish adequate adjustment mechanisms, for instance, a unified budget, which automatically redistributes from countries or regions experiencing a strong economy to those suffering from a recession would be an appropriate shock absorber. The fiscal transfer system can be an important tool to redistribute funds to cushion individual countries or regions affected by an adverse asymmetric shock (Baimbridge and Whyman 2015). This is against the backdrop that the absence of nominal exchange rate adjustments, labour mobility is unlikely to facilitate the adjustment process. Fiscal transfers are part of a non-market based adjustment process (Tavlas 1993). Consequently, fiscal harmonisation would require an advanced degree of political integration and willingness to undertake such risk-sharing. This calls for the need for political or fiscal unions. The importance of fiscal adjustment mechanisms is demonstrated by the US economy, which has a highly federal fiscal system that contributes to regional stabilisation in the case of asymmetric shocks
- Finally, member countries ought to increase both political and economic commitments towards the project and by incorporating regional integration objectives into national development programmes. By so doing, there will be a harmonised development policy aimed at fostering greater compatibility and subsequently achieve convergence between national and regional plans. Thus, the linkage between national economic development policies and regional policy needs to be strengthened. This will reduce the conflict of goals, harmonise development policies aimed at fostering greater compatibility and achieve convergence between national and regional plans and strategies (Oshikoya 2010).

The finding in chapter 5 helps to evaluate the potential trade benefits of a full monetary union in West Africa (ECOWAS). All other things being equal, the thesis argue based on the evidence offered that there is a possible acceleration of regional trade with a common currency. This confirms the hypothesis that single currency (CFA Franc) augments bilateral trade among member countries. The extent to which currencies promote trade requires convertibility.

Consequently, the potential trade creation associated with a common currency is a helpful guide for the WAMZ (ECOWAS) deep integration agenda. There are significant hurdles before WAMZ single currency could become a reality and the dream of realising increase trade benefits. The realisation requires robust political and economic will to achieve the set convergences aimed at fostering cooperation and coordination among member states. Also, this would require political commitment to give up sovereignty for a regional administration like those belonging to the CFA zone. Indeed, there is a consensus among some economists that deeper economic integration could not be sustained without a political union (Krugman and Obstfeld 2009).

Finally, to gauge what potentiality there is in West Africa currency union such as boosting intra-community trade requires scaling up toward industrialisation to transform primary commodities efficiently into manufactured goods. The East Asian experiences, and most recently, China, are underscored as success stories of such diversification (Guzman et al. 2018). Otherwise, these countries may continue to be vulnerable to frequent fluctuations in external terms of trade.

6.3 Limitations

The findings of this study should not be regarded as the sole basis for evaluating the pros and cons of monetary integration in WAMZ. First, it is important to clarify that while this study is entirely an economic analysis, it is vital to acknowledge that monetary cooperation and integration are eminently a political process. However, this study did not consider the political process involved in monetary integration in WAMZ as the scope was limited to the economic process. Second, in chapter four, the study focused on the level of

macroeconomic shock symmetry among the WAMZ countries to assess the cost of abandoning national monetary policies. However, focusing only on one OCA criteria in this study may not capture all the potential costs. Therefore, for a meaningful application of findings of this study, more OCA criteria should be jointly considered for the robustness of the costs involved in the proposed monetary integration in the region.

The other limitation of this study relates to data availability for all the observed countries. In chapter four, five countries out of the six WAMZ members were used in the analysis. WAMZ member country, Liberia was not included due to data limitations. Besides, there were no adequate data for Guinea to use as a proxy for the openness variable. The difficulty of accessing data somewhat limits a certain extent the generalisability of the findings as a representative of WAMZ.

Moreover, having access to quarterly or monthly data may give the actual behaviour of macroeconomic variables among WAMZ economies relative to the low-frequency annual data used in the analysis. However, such series are not available for these countries. For instance, GDP data is only available for WAMZ countries on an annual basis.

6.4 Future work

The work that I have completed as part of this thesis has led to some research avenues:

- Firstly, the empirical work undertaken in chapters 4 focuses on characterising macroeconomic shock asymmetry to assess the cost of WAMZ economies losing monetary policy autonomy. This analysis still provides springboards for assessing the effectiveness of monetary policy in these countries and its effect on the economy, especially its transmission mechanisms.
- Second, assessing the possibility of increased business cycle correlation synchronisation with a common currency through increased trade among the countries (Frankel and Rose 1998).

- Third, the analysis of REER misalignments provides future research, examining whether the deviation of the REER from its equilibrium is determined by monetary arrangements or from real sector rigidities, or investigating the impact of misalignment on the economic growth and the trade balance.
- Fourth, the study examined extensively the economic performance of the countries that belong in the CFA franc zone. Those countries have a common currency pegged to the exchange rate of the French Franc (initially) and now with the Euro. In the wake of the introduction of the euro, some economists argued that the change massively affected many economies, particularly the countries involved in the CFA zone. Though this has not been considered in this study, I believe that future research could reflect on the consequences of this transition on economic development or trade and financial flows between Europe and the Franc zone.
- Finally, the findings from the analyses carried out in Chapter 6 provides further research avenue to refine the nation-specific and sector-specific (or firm-level) effects of a common currency, but this depends on the availability of more accurate data.

Appendices

Appendix 4A.1 Trade Weight Used in Construction of REER and Fundamentals

Country	**Main trade partners**					Total
Ghana	EU (Germany)	China	S/A	US	UK	
A	28.30%	11.58%	10.74%	5.98%	3.87%	60.74
B	0.47	0.20	0.18	0.10	0.06	1
Nigeria	US	China	India	EU (Germany)	UK	
A	14.06%	10.42%	8.50%	13.89%	4.08%	50.95%
B	0.28	0.2	0.17	0.27	0.08	1
Gambia	China	CFA (Senegal)	EU (Germany)	UK	India	
A	25.40%	19.17%	5.32%	2.30%	10.75%	62.94
B	0.4	0.3	0.08	0.04	0.17	1
Liberia	South Korea	China	EU (Germany)	US	Japan	
A	25.65%	15.63%	20.26%	7.91%	3.28%	72.73%
B	0.35	0.21	0.28	0.11	0.05	1
Guinea	EU (Germany)	China	India	US	Chile	
A	26.99%	11.31%	11.50%	4.76%	6.30%	60.86%
B	0.44	0.19	0.19	0.08	0.10	1
Sierra Leone	China	EU (Germany)	UK	US	S/A	
A	28.32%	19.52%	5.32%	4.81%	3.53%	61.50
B	0.46	0.32	0.09	0.08	0.06	1

Source: Author's (2017). A: Trade weight (% of total trade) B: Normalized Trade weight

The following procedure was followed in the construction of REER indexes:

1. The trade weights (w_{ti}) were constructed using Zanello and Desruelle (1997) methodology and data gathered from the International Monetary Fund Directions of Trade (DOTs). The method defined to allow for time variation in the weights:

$W_{it} = \frac{M_{it}+X_{ti}}{\sum_{i=1}^{n} X_{it}+\sum_{i=1}^{n} M_{it}} \sum_{i=1}^{n} W_i = 1$

Where $\sum_{i=1}^{n} X_{it}$, $\sum_{i=1}^{n} M_{it}$ and $\sum_{i=1}^{n} X_{it} + \sum_{i=1}^{n} M_{it}$ are total exports from the domestic country to all the trading partners, total imports of the domestic country from all the trading partners and total trade between the domestic country and all the trading partners respectively. Similarly, X_{ti}, M_{it} and $M_{it} + X_{ti}$ represent exports to trading partners by the domestic country, imports from trading partners by the domestic country and total trade between trading partners and domestic country respectively. The subscript t and i represent the time in all definitions and the 5 major trading partners for each WAMZ country. The weight (W_{it}) is the total share of country j for country i, computed as a five-year average to reduce the impact of individual yearly movements on the trade weights

The computed weights are in table 1.

2. The trading partners chosen were the 5 major trading countries whose trade level accounted for over 50% out of total trade averaged for the period 2010-2014.
3. In all cases the NEER between these countries and their trading partners were obtained from IMF IFS; CPI for trading partners were obtained from IFS and WDI. The CPI and NEER are all re-based so that they all equal 100 in 2000.

Appendix 4A.2 A Lag Order Selection Criteria

Ghana					
Lag	LR	FPE	AIC	SC	HQ
0	NA	3.35e-09	-2.488592	-2.2165	-2.397041
1	297.2065*	3.35e-13	-11.73779	-9.833146*	-11.09694
2	41.72119	4.64e-13	-11.64203	-8.104834	-10.45187
3	48.26502	2.62e-13*	-12.90772*	-7.737964	-11.16825*
The Gambia					
Lag	LR	FPE	AIC	SC	HQ
0	NA	6.47e-07	5.613867	5.931308	5.720676
1	242.6635	8.22e-10	-1.122974	1.416554*	-0.2685
2	71.80030*	4.58e-10	-2.142183	2.619432	-0.540045
3	49.58177	4.11e-10*	-3.679920*	3.303782	-1.330117*
Nigeria					
Lag	LR	FPE	AIC	SC	HQ
0	NA	1.42e-06	0.725579	0.952322	0.801871
1	163.1228*	1.57e-08*	-3.800853	-2.440392*	-3.343099*
2	34.73983	1.65e-08	-3.864785	-1.370606	-3.02557
3	25.93966	2.23e-08	-3.875496*	-0.247599	-2.654819
Sierra Leone					
Lag	LR	FPE	AIC	SC	HQ
0	NA	1.23e-05	8.559163	8.876604	8.665972
1	224.9587	3.17e-08	2.530512	5.070040*	3.384986
2	54.98388	4.50e-08	2.445549	7.207164	4.047688
3	76.30621*	3.56e-09*	-1.521682*	5.462020	0.828122*
Guinea					
Lag	LR	FPE	AIC	SC	HQ
0	NA	1.73e-09	-5.983545	-5.756801	-5.907252
1	144.1525*	3.87e-11*	-9.807374*	-8.446913*	-9.349620*
2	27.15919	5.72e-11	-9.526731	-7.032552	-8.687516
3	29.47254	6.29e-11	-9.745259	-6.117362	-8.524582
* Indicates the optimal lag order selected according to the associated criterion					

Appendix 4A.3 Pantula Principle Test Results for Joint Hypothesis (Trace Test)

	Model 2		**Model 3**		**Model 4**	
	Trace Stat	**Critical Value**	**Trace Stat**	**Critical Value**	**Trace Stat**	**Critical Value**
	Ghana					
0	104.7308	83.93712	128.7880	103.8473	**107.1784***	**95.75366**
1	71.94923	60.06141	86.70601	76.97277	**65.65496**	**69.81889**
2	47.98238*	40.17493	55.41602*	54.07904	**37.24352**	**47.85613**
	The Gambia					
0	84.90512*	83.93712	114.0611*	103.8473	**103.0772***	**95.75366**
1	50.98178	60.06141	73.28463	76.97277	**62.53821**	**69.81889**
2	30.60502	40.17493	40.62661	54.07904	**34.06654**	**47.85613**
	Nigeria					
0	99.09999*	83.93712	119.0225*	103.8473	**98.20322***	**95.75366**
1	52.82749	60.06141	72.75000	76.97277	**55.52418**	**69.81889**
2	30.40266	40.17493	47.07254	54.07904	**31.85319**	**47.85613**
	Sierra Leone					
0	108.1824	83.93712	**131.7523***	103.8473	118.8650	95.75366
1	70.87535	60.06141	**78.55027**	76.97277	73.68037*	69.81889
2	41.52539*	40.17493	**48.40356**	54.07904	45.95597	47.85613
	Guinea					
0	73.31415	60.06141	**82.26850***	**76.97277**	67.41007	69.81889
1	33.15516	40.17493	**41.74709**	**54.07904**	35.68672	47.85613
2	13.55856	24.27596	**20.92214**	**35.19275**	19.83118	29.79707

Notes: * denotes rejection of the null hypothesis of no cointegration. Model 2 assumes no deterministic trend in data; Model 3 allows intercept but no trend in the CE; and Model 4 allows for an intercept and trend in the CE.

Appendix 4A.4 LR statistics for testing weak exogeneity of the foreign and external (oil price) variables

		Ghana	Gambia	Nigeria	Sierra Leone	Guinea
Dln(pro)	χ^2 (1)	8.494	8.514	0.065	10.143	1.320
	p-value	0.003	0.003	0.798	0.001	0.250
Dln(tot)	χ^2 (1)	0.328	3.221	0.898	0.006	1.710
	p-value	0.566	0.072	0.343	0.935	0.190
Dln(oil)	χ^2 (1)	7.449	3.633	1.206	0.008	2.854
	p-value	0.006	0.056	0.271	0.926	0.091
Dln(open)	χ^2 (1)	0.002	0.145	0.467	0.048	-
	p-value	0.966	0.702	0.494	0.826	-
Dln(gov)	χ^2 (1)	0.487	3.422	1.219	1.997	1.230
	p-value	0.485	0.064	0.269	0.157	0.267

Notes: The weak exogeneity test is performed by imposing zero restrictions on the $\boldsymbol{\alpha_i}$ matrix in the error correction equations

Appendix 4A.5 A VECM Diagnostic Tests

Ghana

VEC Residual Serial Correlation LM Tests

Lags	LM-Stat	Prob
1	38.50902	0.3567
2	21.10155	0.9772
3	31.52425	0.6814
4	37.12863	0.4168
5	23.24965	0.9503
6	32.25747	0.6473
7	30.38132	0.7325
8	30.59874	0.7230
9	29.90889	0.7527
10	30.95215	0.7073

Probs from chi-square with 36 df. Null Hypothesis: no serial correlation at lag order h

VEC Residual Normality Tests: Cholesky (Lutkepohl)

Component	Skewness	Chi-sq	df	Prob.
1	0.105641	0.063240	1	0.8014
2	-0.100333	0.057045	1	0.8112
3	0.143959	0.117437	1	0.7318
4	-0.045674	0.011821	1	0.9134
5	0.196429	0.218645	1	0.6401
6	1.313268	9.773143	1	0.0018
Joint		10.24133	6	0.1149

Component	Kurtosis	Chi-sq	df	Prob.
1	2.034103	1.321689	1	0.2503
2	3.455035	0.293331	1	0.5881
3	2.771128	0.074208	1	0.7853
4	2.572006	0.259504	1	0.6105
5	2.308748	0.676925	1	0.4106
6	6.103033	13.64082	1	0.0002
Joint		16.26648	6	0.0124

Component	Jarque-Bera	df	Prob.
1	1.384930	2	0.5003
2	0.350376	2	0.8393
3	0.191645	2	0.9086
4	0.271325	2	0.8731
5	0.895570	2	0.6390
6	23.41396	2	0.0000
Joint	26.50781	12	0.0091

Null Hypothesis: residuals are multivariate normal

VEC Residual Heteroskedasticity Tests: No Cross Terms (only levels and squares)

Joint test:

Chi-sq	df	Prob.
310.3272	294	0.2455

6 The Gambia

VEC Residual Serial Correlation LM Tests

Lags	LM-Stat	Prob
1	26.91213	0.8636
2	32.07848	0.6557
3	23.58904	0.9446
4	28.58861	0.8056
5	26.26241	0.8831
6	45.52357	0.1328
7	46.95706	0.1045
8	38.14791	0.3720
9	31.82827	0.6673
10	32.31112	0.6448

Probs from chi-square with 36 df. Null Hypothesis: no serial correlation at lag order h

VEC Residual Normality Tests: Cholesky (Lutkepohl)

Component	Skewness	Chi-sq	df	Prob.
1	-0.678147	2.606007	1	0.1065
2	-0.012912	0.000945	1	0.9755
3	-0.684503	2.655083	1	0.1032
4	-0.191097	0.206935	1	0.6492
5	0.288157	0.470530	1	0.4927
6	-1.619803	14.86798	1	0.0001
Joint		20.80747	6	0.0020

Component	Kurtosis	Chi-sq	df	Prob.
1	3.654088	0.606094	1	0.4363
2	2.968682	0.001390	1	0.9703
3	4.048374	1.557041	1	0.2121
4	2.740341	0.095516	1	0.7573
5	3.155519	0.034264	1	0.8531
6	8.455021	42.15611	1	0.0000
Joint		44.45041	6	0.0000

Component	Jarque-Bera	df	Prob.
1	3.212101	2	0.2007
2	0.002334	2	0.9988
3	4.212124	2	0.1217
4	0.302451	2	0.8597
5	0.504794	2	0.7769
6	57.02409	2	0.0000
Joint	65.25789	12	0.0000

Null Hypothesis: residuals are multivariate normal

VEC Residual Heteroskedasticity Tests: No Cross Terms (only levels and squares)

Joint test:

Chi-sq	df	Prob.
312.4108	294	0.2203

7 Nigeria

VEC Residual Serial Correlation LM Tests

Lags	LM-Stat	Prob
1	16.03633	0.9137
2	22.54346	0.6042
3	24.63620	0.4829
4	16.37322	0.9033
5	20.22628	0.7349
6	29.47684	0.2445
7	20.64594	0.7122
8	25.41341	0.4394
9	29.86582	0.2294
10	22.53757	0.6045

Probs from chi-square with 25 df. Null Hypothesis: no serial correlation at lag order h

VEC Residual Normality Tests: Cholesky (Lutkepohl)

Component	Skewness	Chi-sq	df	Prob.
1	-0.436451	1.047695	1	0.3060
2	0.853225	4.003960	1	0.0454
3	-0.943302	4.894002	1	0.0270
4	0.012660	0.000881	1	0.9763
5	-0.443857	1.083549	1	0.2979

Joint		11.03009	5	0.0508

Component	Kurtosis	Chi-sq	df	Prob.
1	2.918946	0.009033	1	0.9243
2	4.854629	4.729515	1	0.0296
3	3.870803	1.042659	1	0.3072
4	2.397679	0.498837	1	0.4800
5	3.330354	0.150059	1	0.6985
Joint		6.430103	5	0.2666

Component	Jarque-Bera	df	Prob.
1	1.056728	2	0.5896
2	8.733475	2	0.0127
3	5.936661	2	0.0514
4	0.499718	2	0.7789
5	1.233608	2	0.5397
Joint	17.46019	10	0.0648

Null Hypothesis: residuals are multivariate normal

VEC Residual Heteroskedasticity Tests: No Cross Terms (only levels and squares)

Joint test:

Chi-sq	df	Prob.
327.2746	330	0.5320

8 Sierra Leone

VEC Residual Serial Correlation LM Tests

Lags	LM-Stat	Prob
1	20.74361	0.7068
2	41.72677	0.0192
3	26.92602	0.3596
4	16.10532	0.9117
5	31.95659	0.1593
6	29.86316	0.2295
7	18.63817	0.8141
8	14.41703	0.9540
9	30.42304	0.2088
10	24.79804	0.4737

Probs from chi-square with 25 df. Null Hypothesis: no serial correlation at lag order h

VEC Residual Heteroskedasticity Tests: No Cross Terms (only levels and squares)- Joint test:

Chi-sq	df	Prob.
333.2235	330	0.4400

VEC Residual Normality Tests (Cholesky (Lutkepohl)

Component	Skewness	Chi-sq	df	Prob.
1	-0.295401	0.479941	1	0.4884
2	-0.269433	0.399269	1	0.5275
3	-0.942244	4.883028	1	0.0271
4	-0.151752	0.126657	1	0.7219
5	-0.092542	0.047102	1	0.8282
Joint		5.935997	5	0.3125

Component	Kurtosis	Chi-sq	df	Prob.

1	3.341289	0.160157	1	0.6890
2	2.131016	1.038308	1	0.3082
3	4.546555	3.288771	1	0.0698
4	2.627023	0.191279	1	0.6619
5	2.368932	0.547590	1	0.4593
Joint		5.226105	5	0.3889

Component	Jarque-Bera	df	Prob.
1	0.640098	2	0.7261
2	1.437577	2	0.4873
3	8.171799	2	0.0168
4	0.317936	2	0.8530
5	0.594692	2	0.7428
Joint	11.16210	10	0.3450

Null Hypothesis: residuals are multivariate normal

9 Guinea

VEC Residual Serial Correlation LM Tests

Lags	LM-Stat	Prob
1	16.08169	0.9124
2	17.12945	0.8770
3	12.52978	0.9818
4	23.41956	0.5531
5	22.33903	0.6161
6	23.10842	0.5712
7	18.72115	0.8103
8	42.42376	0.0162
9	14.23038	0.9576
10	32.07482	0.1559

Probs from chi-square with 25 df.

VEC Residual Normality Tests

Component	Skewness	Chi-sq	df	Prob.
1	-1.389718	10.62224	1	0.0011
2	0.215675	0.255835	1	0.6130
3	0.690072	2.619099	1	0.1056
4	0.432928	1.030847	1	0.3100
5	0.517109	1.470709	1	0.2252
Joint		15.99873	5	0.0068

Component	Kurtosis	Chi-sq	df	Prob.
1	8.231716	37.63492	1	0.0000
2	2.668803	0.150826	1	0.6977
3	3.349925	0.168365	1	0.6816
4	2.443203	0.426282	1	0.5138
5	3.004013	2.21E-05	1	0.9962
Joint		38.38041	5	0.0000

Component	Jarque-Bera	df	Prob.
1	48.25715	2	0.0000
2	0.406662	2	0.8160
3	2.787464	2	0.2481
4	1.457129	2	0.4826
5	1.470731	2	0.4793
Joint	54.37914	10	0.0000

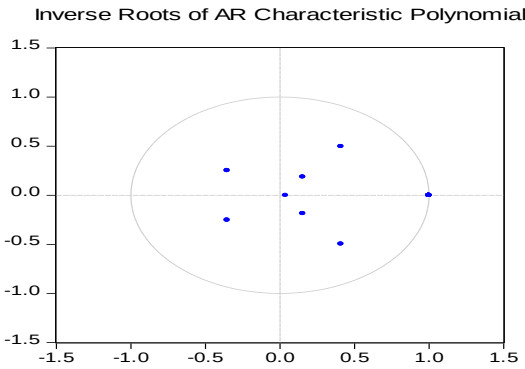
VEC Residual Heteroskedasticity Tests: No Cross Terms (only levels and squares)

Joint test:

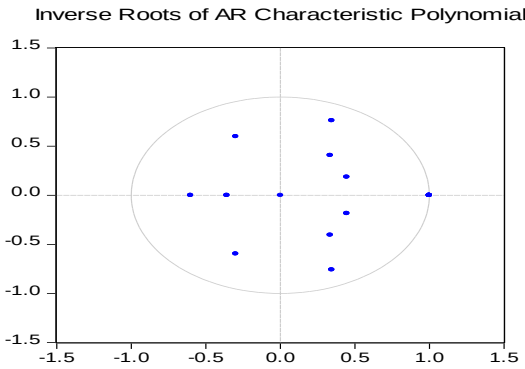
Chi-sq	df	Prob.
334.3953	330	0.4222

Inverse Roots Tests

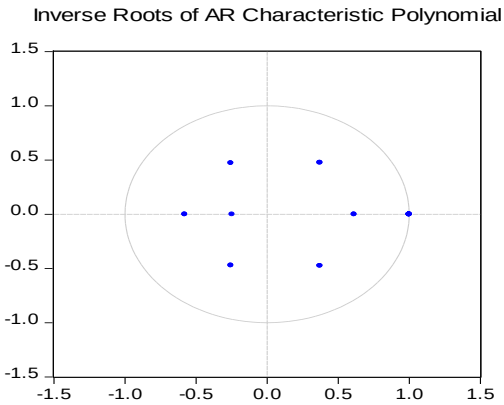
Ghana



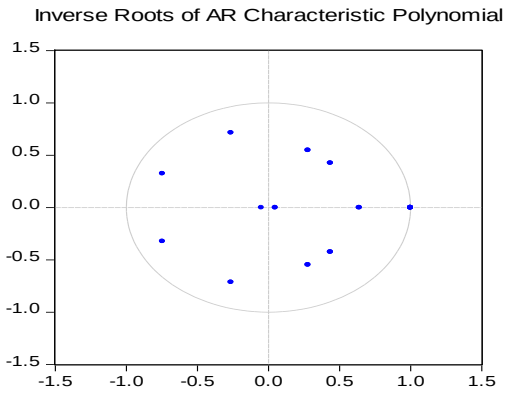
Nigeria



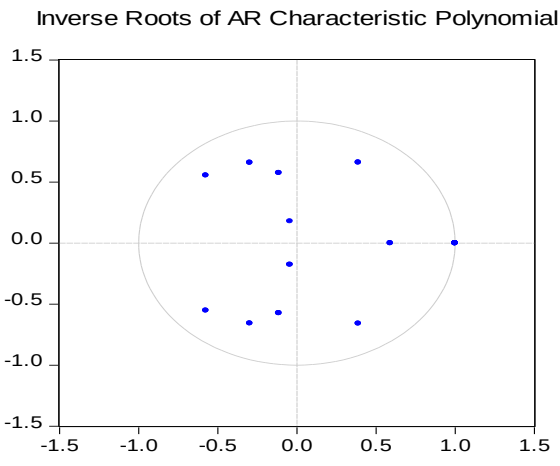
The Gambia



Sierra Leone



Guinea



Appendix 4A.6 Variance decomposition

Horizon	**Demand Shock**	**Supply shock**	**Terms of trade shock**	**Demand Shock**	**Supply shock**	**Terms of trade shock**
	(%)	(%)	(%)	(%)	(%)	(%)
Ghana				The Gambia		
1	81.56	13.02	5.42	98.71	1.01	0.28
2	76.50	15.59	7.91	94.91	1.17	3.92
3	76.34	15.72	7.94	94.03	1.38	4.60
4	76.20	15.79	8.01	93.78	1.44	4.78
5	76.18	15.81	8.01	93.71	1.46	4.83
6	76.18	15.81	8.01	93.70	1.47	4.84
10	76.17	15.82	8.01	93.69	1.47	4.84
Guinea				Nigeria		
1	86.00	0.30	13.70	81.77	5.35	12.88
2	84.62	0.81	14.57	79.69	6.54	13.77
3	83.72	1.87	14.41	79.76	6.52	13.72
4	83.72	1.88	14.41	79.76	6.52	13.72
5	83.72	1.88	14.41	79.76	6.52	13.72
6	83.72	1.88	14.41	79.76	6.52	13.72
10	83.72	1.88	14.41	79.76	6.52	13.72
Sierra Leone						
1	99.14	0.53	0.33			
2	92.48	4.47	3.05			
3	92.19	4.74	3.07			
4	92.15	4.77	3.08			
5	92.15	4.77	3.08			
6	92.15	4.77	3.08			
10	92.15	4.77	3.08			

Appendix 5A.1 Theoretical development of gravity model

Since Tinbergen (1962) the application of the gravity equation was not without shortcomings. It has appeared that the model lacks solid and coherent theoretical foundations with criticisms ranging from: the lingering perception that gravity equations can better be applied to examine phenomena related to physics rather than economics, the model do not incorporate structural differences that would affect the determinants of trade such as (Deardorff 1984).

In relation to the above criticisms and limitations, the earliest attempt to provide a theoretical foundation dates to Linnemann (1966), however Anderson (1979) is mostly cited as the first to set forth a conventional economic explanation for deriving the gravity equation. Anderson (1979) theoretical motivation was based on the Cobb-Douglas Theorem and the constant elasticity of substitution (CES) preference. In addition, the paper applied the Armington assumption that goods are nationally differentiated (differentiated products by country of origin)[101] and consumers have preferences defined over all the differentiated products. In other words, countries consume at least some of every good from every country, no matter what the costs are. Hence, all goods are traded, all countries participate in international trade, and in equilibrium national income is the sum of home and foreign demand for the commodity that each nation produces. For this reason, larger countries tend to export and import more (Seid 2013). The major drawback of this model is the assumption that all prices are constant, considering the asymmetric trade costs argument that prices differ across producers in theory (Bacchetta et al. 2012).

Subsequently, other scholars have tried to demonstrate that the gravity model can arise out of a range of trade theories. (Bergstrand 1985; Bergstrand 1989) extended Anderson derivation with monopolistic competition developed by (Krugman 1980) but retained the CES preference structure to derive an abridged gravity equation. In contrast to the Armington assumption Bergstrand suggested product differentiation amongst firms instead of the location of

[101] The assumption that international trade flows are distinguished by their origin was originally put forward in (Armington, 1969).

production (Bacchetta et al. 2012). Firm location is endogenously determined, and countries are specialized in the production of different sets of goods. Furthermore, the model argued that price effects should be included in the model, thereby approaching the debate from the supply side. On the other hand, Helpman and Krugman (1985) from the new trade theories applied a differentiated product framework with increasing returns to scale to validate the gravity model. Deardorff (1998) also explained that gravity model can arise from a factor endowments explanation of trade in a Heckscher-Ohlin (H-O). Eaton and Kortum (2002) also considered a gravity-type equation from a Ricardian type of model, and Helpman et al. (2008) and Chaney (2008) developed a gravity model from a theoretical model of international trade in differentiated goods with firm heterogeneity (Bacchetta et al. 2012).

Finally, with the publication of Anderson and van Wincoop (2003), the conventional wisdom that gravity equations lacked micro-foundations was finally dismissed. Anderson and van Wincoop (2003) derived an operational gravity model based on the manipulation of the CES system and introduced multilateral resistance terms. They argue that the traditional gravity equation with bilateral frictions (trade costs affected by spatial distance, language difference, trade restrictions, etc.) appear to be inadequate to fully explain the trade flow between countries. They show that when predicting trade flows between any pair of countries, the effect of third countries should be considered. The multilateral resistance factors introduced in the standard gravity equation was decomposed into three components: bilateral trade barriers between region i and region j; region $i's$ resistance to trade with all regions, and region $j's$ resistance to trade with all regions (Novy 2013). Basically, these multilateral resistance factors capture the fact that bilateral trade flows do not only depend on bilateral trade barriers but also on trade barriers across all trading partners. These developments provided a strong theoretical foundation and subsequently facilitated augmentation of the gravity model with various specifications.

Appendix 5A.2 Heteroscedasticity tests

A. The modified Wald test for group-wise heteroscedasticity

The modified Wald test for group-wise heteroscedasticity is used to assess the potential problems of heteroscedasticity in a simple fixed effect model. The null hypothesis is homoscedasticity (or constant variance). It is clear from BOX 1 below that the null is strongly rejected, and we can conclude the presence of heteroscedasticity.

Box 1.

. xttest3	
Modified Wald test for groupwise	heteroskedasticity
in fixed effect regression model	
H0: sigma(i)^2 = sigma^2 for all	i
chi2 (210) = 1.8e+05	
Prob>chi2 = 0.0000	

Furthermore, the model is tested for heteroskedasticity using the Breusch-Pagan / Cook-Weisberg test. The $\chi^2(1) = 67.12$ is significant at the 1% level of significance, hence the residuals are heteroskedastic, See Box 2.

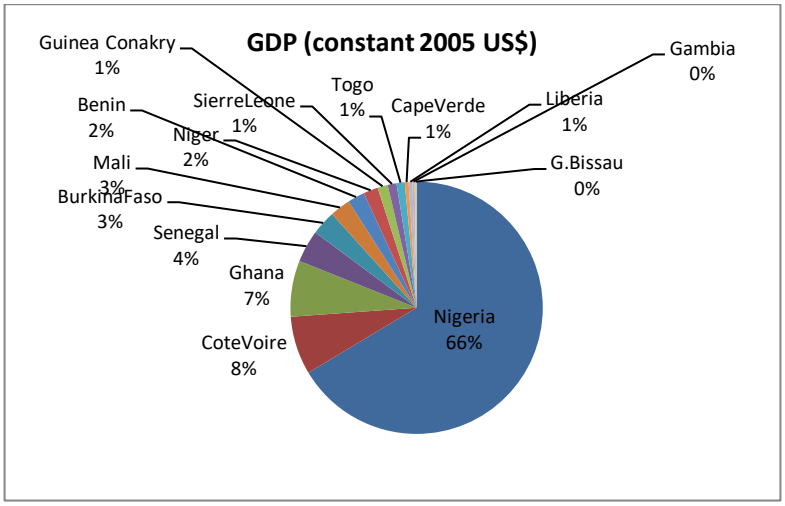
Box 2.

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of lnrtrade1

         chi2(1)      =    67.12
         Prob > chi2  =   0.0000
```

Appendix 5A.4 GDP of ECOWAS members (Share in 2013)



Source: Authors Compilation: Data from World Development Indicators

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